The Seventh Annual Emerging Information And Technology Conference

Nanotechnology,
System-on-Chip,
Bioinformatics & Systems Biology,
C4I,
Emerging Energy Technology,
AABF
Workshops

August 9 – August 10 (Thursday, Friday), 2007
Friend Center, Princeton University
Princeton, New Jersey, U.S.A.

In Memoriam

EITC/AABF (Asian American Business Forum) advisory board member, the conference co-organizer of EITC-2007, and founding partner for PBI Tech Partners, Mr. Pao-Chien (Daniel) Di, passed away unexpectedly on Thursday, July 12, 2007 at his home in Monroe, New Jersey. He was 49.

Born and raised in Taiwan, Daniel received his graduate degree in electric engineering in US in 1984. During the early part of his career, he worked for many prestigious information technology companies. His keen sense of business advanced him to VP of operation and business development for Foxconn in 2001-the turning point of his late career toward business, finance and investments. He was an amazing person and loved learning new things. After obtaining his EMBA degree from Wharton School at U. Penn, he enrolled himself into Stern Business School at NYU.

Daniel enjoyed assisting others through his personal connections. Born with great leadership, he used his influential power to help change the world around him. Much of his spare time was dedicated to the Chinese community services. He was the principal of a Chinese school and board member and chairman for many non-profit organizations. This, however, was only the prologue to his great vision: he wished to see more of the Chinese community to get involved in the public service and infuse more political influence at the state and federal levels. With that, he served as a fundraising committee for Governor Jon Corzine, attended Leadership New Jersey Program, and planned to run as a Federal Congressman in the future. He truly was a great man. Unfortunately, to the sadness of his friends, his dream was unexpectedly cut short.

Daniel is survived by his wife, Szu-Ping; his son, Christopher Anthony; and his parents, Dao-Hon Di and She-Haw Di. They, as well as many of friends and colleagues, miss him and his remarkable character deeply.

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Welcome Message

Distinguished colleagues:

We warmly welcome all of you to come to the 7th Emerging Information and Technology Conference (EITC). This year, it will be held once again at Princeton University. With experience gained from the past few years, many improvements have been made in the content and structure of EITC conference. We believe you will find EITC 2007 very enjoyable and be delighted by the added effectiveness.

For six years, a team of visionary technology leaders from United States and Asia recognized that in the new millennium, globalization is a driving force for accelerated intellectual and economic interactions between North America and Asia Pacific. Such interactions will surely be one of the most important components for technology development and innovations in the 21st century. This team of leaders gave birth to the Emerging Information Technology Conference, which is the only conference include leading individuals in North America and Asia Pacific for the highest level of discussions in science, technology and their economic implications with an Asian cultural flavor.

The main purpose of EITC is connecting the dots to form a big picture for vision and talents. We have assembled many truly outstanding and legendary leaders around the world with multiple disciplines to attend this conference. We believe we can achieve the multi-dimensional aims of the conference. We put special emphasis on the function of inter-discipline knowledge exchange this year so that each of us will expand our vision and be inspired to reach the next level. We also will work hard on supporting the networking component of the conference to energize the younger scholars with what they need for their career paths.

The theme for EITC 2007 is “Technologies for a Healthier Future”. We truly look forward to experts from Nano, SoC, C4I, System biology-bioinfomatics, energy, and business track, as well as many university leaders to share with us the history, status, and vision of different technologies that will bring us a healthier society tomorrow.

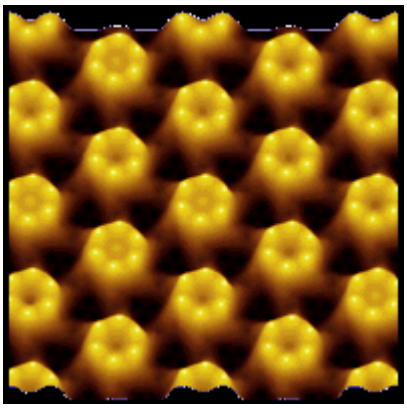
Once again, thank you for taking your most valuable time to come to EITC 2007 in Princeton, New Jersey. We hope that you will also enjoy the time in visiting this world class university and the beautiful town famous for its former resident, Albert Einstein.

Sincerely yours,

Li-Shiuan Peh, Princeton University
Eric Y. Chuang, National Taiwan University

Conference Themes

Nanotechnology Workshop



Nanotechnology, emerging from nanoscience and nanoengineering is expected to lead the next industrial revolution through the 21st century. It is tiny, on the scale of one billionth of a meter (nano-meter or nm), yet its impact on our life will be tremendous. It is expected to change everything from agriculture to medicine and from electronics to mechanics. Nanometer scaled devices are imagined to be the smallest and fastest computer, smart and potent medicine, and self-replicating machines. Two approaches are being adopted to fabricate these devices. The top-down process such as to shrink the MEMS to NEMS and the bottom-up approach by synthesizing nano- parts via self-assembly process.

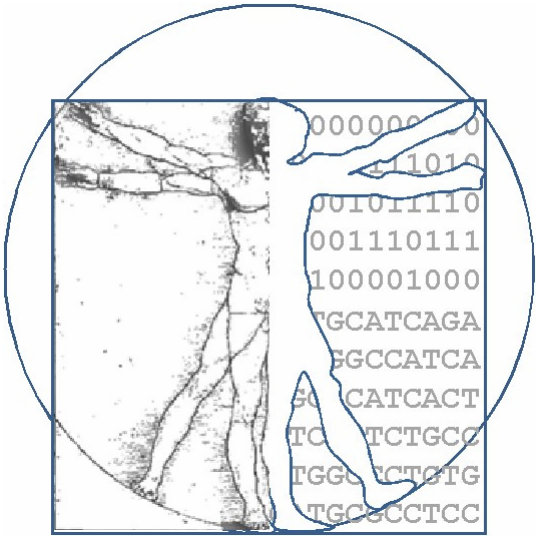
There is an intense interest in Nanotechnology stemming from the fact that developed countries and visionary businesses are rushing to invest and taking a leading position in. Additionally this vast frontier technology is open to chemists, physicists, molecular biologists, material scientists, engineers and literally anyone with new ideas and a want to explore and discover. If you have a thirst for exploration and wish to make your mark in science history, join us to learn more, make contacts, and share ideas with other experts in this brand new field.

System on Chip Workshop

Driven by the rapid growth of the Internet, wireless communications, and pervasive computing, the integration of an entire VLSI system onto a single silicon chip has brought revolutionary changes to the IT industry and become increasingly important. The proliferation of System-on-Chip (SoC) devices is evidenced by the ubiquity of cellular phones, portable music and video players, set-top-boxes, digital cameras, etc. The design and manufacturing of SoC systems have become the driving force behind the march to even smaller, faster, and cheaper semiconductor devices.

The SoC track of EITC-2007 provides a forum for sharing recent advances and discussing new challenges in the SoC design. We hope it will bring together SoC experts from both academic and industrial communities to discuss and solve critical hardware and software issues in SoC designs. It is our goal to develop cost-effective, low-power, and secure SoC systems and applications with increased productivity. At EITC-2007, topics of interest on the SoC track include, but are not limited to, design methodology, design automation tools, system architectures, real-time OS and applications, security, and manufacturing technologies.

Bioinformatics & Systems Biology Workshop



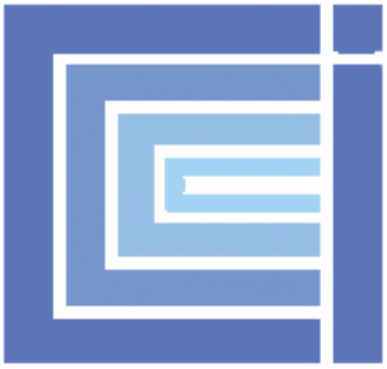
The world is in the midst of an information and communication technological revolution that is transforming almost every aspect of our lives. The intersection of information technology and biotechnology has become critically important because of the vast amount of data involved in the study of biology. Bioinformatics is very much a discipline in expansion as evidenced by the convergence of Biology, Computer Science, Information and Communication Technology, Mathematics and Statistics.

Bioinformatics highlights the application of statistics, data mining, artificial intelligence, neural networks, machine learning and natural language processing techniques to computationally difficult problems in molecular biology. It is dedicated to provide researchers the knowledge and skills necessary for the invention of algorithms and the creation of computational systems that facilitate the understanding of biological processes and application of these tools and methods to individuals and communities through public health and prevention programs. Meanwhile, advances in high-throughput biotechnology and novel bioassays at the single-cell level have

fundamentally changed the way people study biology. Systems biology takes advantage of these vast amounts of data, and aims to study how the individual components of a biological systems coordinate using computational modeling at the transcriptional and proteomic levels. The interplay of bioinformatics and systems biology thus allows us to go beyond genomics to decipher how these DNA sequences dictate the complex functions in living organisms.

The Bioinformatics and Systems Biology Track of EITC-2007 will focus on the current research and development frontiers in both academia and industry. This year, we invited leading scientists to present on four important topics. The two sessions on day one, with themes on Computational Methods for Systems Biology and Proteomic Bioinformatics, showcase the diverse and promising research directions in bioinformatics and systems biology. On the second day, we cover Computational Models for Cancer Biology and High-Throughput Genotyping Studies, and explore how the synergy of bioinformatics and systems biology may facilitate disease research. We expect our program will engage dialogues across disciplines and invite discussions in the forefront of biomedical informatics.

Content, Computer, Communications, Consumer Electronics, and Integration (C4I) Workshop



With the dramatic and progressive improvement of computing and communications technologies, the Internet today has evolved into a diverse computing platform and infrastructure to support programmability and software-driven services on a global scale. The Internet services arena represents the next major bellwether in the IT industry, very much like the PC revolution and the web. Internet services such as search, web community, web email, and instant messaging have already made a huge impact on people's daily lives, and have changed the nature of work and interactions. With the ubiquity of broadband and wireless networking, people are increasingly being drawn toward software-based Internet services. This is because of the pervasiveness and simplicity of such services, and its ability to deliver integrated and seamless user experiences. The Internet services wave is not only causing a paradigm shift in computing that started with consumers but is also progressively working its ways toward enterprise development with the growing importance of service-based Internet economics. A good example is the new business model now emerging in the form of advertising-supported services and software.

To understand the new challenges and opportunities Internet services presents, the Content, Computer, Communications, Consumer electronics, and Integration (C4I)

program track will bring together industry leaders to share their insights on technical trends and discuss what the IT industry can do to leverage the Internet services wave.

Emerging Energy Technology (EET) Workshop

The energy technology is one of the four key technologies for the 21st century. The world is moving away from the fossil fuel economy due to the fact that oil fields are mainly located at the politically unstable region, the economic growth of China and India, the limitation of fossil fuel supply and the requirement of emission reduction (due to the Kyoto Protocol). Worldwide researches on renewable energy technology have been very intensive recently including the hydrogen production, storage, and transportation infrastructure, fuel cell technology, solar energy, wind power, biomass, etc. In addition, with the advance in the technology, nuclear energy has regained its status and become a very promising energy production technology.

Since it is a clean energy source, has lower impact to the environment, and never runs out, renewable energy has drawn great attention among industry. Solar electricity, fuel cell, and wind generation are the most mature and cost effective resources among different renewable energy technologies. Hydrogen is not a primary energy source but an energy carrier. Hydrogen must be produced from chemical species with hydrogen, e.g., methane (natural gas), methanol, or water. Recently, there have been abundant researches on hydrogen production, storage, and transportation. The research on solar electricity focuses on developing/discovery new materials and process to reduce the cost and improve the efficiencies of energy conversion. Several different kinds of fuel cells have been extensively studied. Nanotechnologies have been applied to develop new catalyst, new materials for electrolyte as well electrodes. Polymer electrolyte membrane fuel cells are most probable for transportation uses; hybrid power systems of solid oxide fuel cell and gas turbine potentially have significantly higher energy efficiency, while micro direct methanol fuel cells are probably most suitable for the power source of 3C products due to their potentially high energy density. Parallel operation of fuel cell with other sources of energy sources is also an important issue for future MicroGrid and Smart Grid development. The development of wind generation has rapidly progressed over the last decade. With the advance in wind turbine technologies, wind energy has become competitive with other fuel-based generation resources. The fluctuation of wind, however, makes it difficult to optimize the use of wind power generation. The research on harvest potential wind capacity will have great impact on energy conservation and system security.

Indeed, nuclear energy is also a critical option for future energy economy. With the advance in the technology, nuclear energy has regained its status and become a very promising energy production technology to meet future demand with minimum environmental impact.
The energy technology track will provide a platform for the exchange of the state-of-the-art renewable and nuclear energy technologies.

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Conference Program

	8-Aug	9-Aug	10-Aug
8:00-9:00		Registration	Registration
9:00-9:15		Opening Speech	University Leader's Forum
9:15-10:45		Plenary Session P1	
10:45-11:00		Break	Break
11:00-12:30		Technical Session T1-T5; Business Session B1 (Biotech/Pharma Keynote)	Technical Session T11-T12; Business Session B3
12:30-13:30		Lunch	Lunch
13:30-15:45		Keynote Session	Plenary Session P2
15:45-16:00		Break	Break
16:00-17:30		Technical Session T6-T10; Business Session B2	Technical Session T13-T15; Business Session B4
Evening	7pm-10pm Dinner - Invited guests only	7pm-10pm Dinner - Invited guests only	7pm-10pm Dinner - Invited guests only

Day 1 (Thursday, August 9, 2007)

Wednesday, August 8, 2007

8/8 (Wed) 7:00 pm – 10:00 pm : Reception (Invited guests only)

Host: Taipei Economic and Cultural Office in New York (TECO – New York)

After Banquet Speech:

"In Search of Humanistic Excellence - Morehouse Experience"
Dr. Da Hsuan Feng (fengd@utdallas.edu)
The University of Texas at Dallas and (Soon-to-be) Senior Executive Vice President
National Cheng Kung University

Thursday, August 9, 2007

8/9 (Thu) 8:00 am - 9:00 am : Registration

Room: Atrium, Computer Science 104

8/9 (Thu) 9:00 am - 9:15 am : Opening Speech

Room: Friend Center 101

Conference Chairs:

Professor Li-Shiuan Peh (peh@ee.princeton.edu)
Department of Electrical Engineering, Princeton University

Professor Eric Y. Chuang (chuangey@cc.ee.ntu.edu.tw)
Department of Electrical Engineering, National Taiwan University

8/9 (Thu) 9:15 am - 10:45 am : Plenary Session P1

Chairs: Professor Eric Y. Chuang (chuangey@cc.ee.ntu.edu.tw), National Taiwan University
Room: Friend Center 101

"Research at National Cheng Kung University"
Professor Yonhua Tzeng (tzengyo@auburn.edu)
Vice President, Office of Research and Development
National Cheng-Kung University

Professor Benjamin Hsiao (bhsiao@notes.cc.sunysb.edu)
Department of Chemistry, the State University of New York at Stony Brook

Professor Jing-Tang Yang (jtyang@pme.nthu.edu.tw)
Department of Power Mechanical Engineering
Institute of Nanoengineering and Microsystems
National Tsing Hua University

Professor Kai Li (li@cs.princeton.edu)
Department of Computer Science, Princeton University

Professor Wei-Jen Lee (lee@exchange.uta.edu)
Director of Energy Systems Research Center
Department of Electrical Engineering, the University of Texas at Arlington

Professor Yibin Kang (ykang@princeton.edu)
Department of Molecular Biology, Princeton University

Dr. Chung Jen Ho (Chung.Ho@quovadx.com)
Chief Software Architect, Quovadx Inc.

8/9 (Thu) 10:45 am - 11:00 am : Break

Host: The Hong Kong Applied Science and Technology Research Institute Limited (ASTRI)
Room: Atrium, Friend Center 101

Parallel Sessions:
8/9 (Thu) 11:00 am – 12:30 pm : Technical Session T1 – Nanotechnology (I)

Chair: Professor Jing-Tang Yang (jtyang@pme.nthu.edu.tw), National Tsing Hua University
Room: Friend Center 304

"The Development of Nanotechnology Human Resource Program in Taiwan"
Professor Jing-Tang Yang (jtyang@pme.nthu.edu.tw)
Department of Power Mechanical Engineering &
Institute of Nanoengineering and Microsystems
National Tsing Hua University

"Taiwan's Nanotechnology K-12 Educational Promotion – How We Teach Nanotechnology to Kindergarten-12th Grade Young Kinds in Taiwan"
Professor Horn-Jiunn Sheen (sheenh@ntu.edu.tw)
Institute of Applied Mechanics
National Taiwan University

"Fabrication of PLGA Microvessel Scaffold Made Up of Circular Microchannels with Inner Nano Patterns"
Professor Gou-Jen Wang (gjwang@dragon.nchu.edu.tw)
Department of Mechanical Engineering &
Institute of Biomedical Engineering
National Chung Hsing University

"Applications of Nanoindentation Technology to Study the Mechanical Properties and Fatigue Behavior of Hard Thin Films"
Professor Jen-Fin Lin (jflin@mail.ncku.edu.tw)
Professor and Chair, Department of Mechanical Engineering
National Cheng Kung University

"ZnO Nanowire-based Gas Sensors"

Shoou-Jinn Chang (changsj@mail.ncku.edu.tw)
Associate Director, Center for Micro/Nano Science and Technology
Professor, Department of Electrical Engineering
National Cheng Kung University

8/9 (Thu) 11:00 am – 12:30 pm : Technical Session T2 – Bioinformatics & Systems Biology (I): Computational Methods for Systems Biology

Chair: Professor Frank Hsu (hsu@cis.fordham.edu), Fordham University
Room: Friend Center 305

"Computational Analysis of Transcriptional Regulation"
Professor Sridhar Hannenhalli (sriharh@pcbi.upenn.edu)
Department of Genetics, University of Pennsylvania

"Is Less More? On Statistical Investigation for Large Biological Networks"
Professor Henry Horng-Shing Lu (hslu@stat.nctu.edu.tw)
Institute of Statistics, National Chiao-Tung University

"Predicting Protein-Protein Interaction using the Identification of Putative Interaction Sites"
Professor Cheng-Yan Kao (cykao@csie.ntu.edu.tw)
Computer Science and Information Engineering
National Taiwan University

8/9 (Thu) 11:00 am – 12:30 pm : Technical Session T3 – C4I (I)

Chair: Dr. Chung Jen Ho (Chung.Ho@quovadx.com), Quovadx Inc.
Room: Friend Center 306

"SMART HOSPITAL™: Translating Science into Practices that Save Lives"
Professor Carolyn L. Cason (clcason@uta.edu)
Associate Dean for Research
School of Nursing, the University of Texas at Arlington

"Intelligent and Ubiquitous Patient Monitoring by Using Data Mining and Telecare Techniques"
Professor Vincent S. Tseng (tsengsm@mail.ncku.edu.tw)
Director, Department of Medical Informatics
National Cheng-Kung University

"RHIN Architectural Models and HIE Appliance"
Dr. Chung Jen Ho (Chung.Ho@quovadx.com)
Chief Software Architect, Quovadx Inc.

8/9 (Thu) 11:00 am – 12:30 pm : Technical Session T4 – Emerging Energy Technology (I)

Chair: Professor Wei-Jen Lee (wlee@uta.edu), the University of Texas at Arlington
Room: Friend Center 307

"Environmentally Friendly Integrated Oil Refining Complex"
Dr. Nai Y. Chen (naiychen@earthlink.net)

The University of Texas at Arlington

"Solar Cell Technologies Beyond Silicon"
Professor Meng Tao (mtao@uta.edu)
Department of Electrical Engineering
The University of Texas at Arlington

"Wind Generation Capacity Forecasting to Improve the Unit Commitment Scheduling"
Professor Wei-Jen Lee (lee@exchange.uta.edu)
Director of Energy Systems Research Center
Department of Electrical Engineering, the University of Texas at Arlington

8/9 (Thu) 11:00 am – 12:30 pm : Technical Session T5 – System-on-Chip (I)

Chair: Professor Li-Shiuan Peh (peh@ee.princeton.edu), Princeton University
Room: Friend Center 110

"Design Automation for Three-Dimensional Integrated Circuits"
Professor Yuan Xie (yuanxie@cse.psu.edu)
Department of Computer Science and Engineering, the Pennsylvania State University

"Secure Key Management Architecture for Sensor Networks"
Dr. Dahai Xu (dahaixu@princeton.edu)
Department of Electrical Engineering, Princeton University

"System-on-Chip Solution for Non-Copyable Disk"
Michael S. Wang (mswang@princeton.edu)
Department of Electrical Engineering, Princeton University

8/9 (Thu) 11:00 am – 12:30 pm : Business Session B1 – Biotech/Pharma Keynote

Chair: Dr. Alex Chang (alex.chang@caliperls.com), Associate Director of Business Development, Caliper Life Sciences, Discovery Alliances & Services Division (Xenogen Biosciences)
Room: Friend Center 203

Dr. Geert Cauwenbergh (gcauwenbergh@BARRIERTHERAPEUTICS.COM)
Chief Executive Officer and Founder, Barrier Therapeutics

8/9 (Thu) 12:30 pm - 1:30 pm : Lunch

Room: Atrium, Computer Science 104

8/9 (Thu) 1:30 pm - 3:45 pm: Keynote Session

Chair: Professor Li-Shiuan Peh (peh@ee.princeton.edu), Princeton University
Room: Friend Center 101

"From Research to Social Change"
Professor Gregory C Chow (gchow@princeton.edu)
Department of Economics, Princeton University

"Past, Present, and Future of Silicon IC Technology"
Professor Tso-Ping Ma (t.ma@yale.edu)
Chair of the Department of Electrical Engineering, Yale University

"Integrated Protein Bioinformatics for Translational Systems Biology"
Professor Cathy H. Wu (wuc@georgetown.edu)
Director of Protein Information Resource
Department of Biochemistry and Molecular & Cellular Biology
Georgetown University Medical Center

8/9 (Thu) 3:45 PM - 4:00 pm : Break

Room: Atrium, Friend Center 101

Parallel Sessions:

8/9 (Thu) 4:00 pm – 5:30 pm : Technical Session T6 – Nanotechnology (II)

Chair: Lei Zhu (lzhu@mail.ims.uconn.edu), University of Connecticut
Room: Friend Center 304

"Physical, Chemical and Biological Properties of Metals at the Nanoscale Dimension"
Professor Chuan-Jian Zhong (cjzhong@binghamton.edu)
Department of Chemistry
State University of New York at Binghamton

"Biomaterials for Vocal Fold Tissue Regeneration"
Professor Xinqiao Jia (xjia@udel.edu)
Department of Materials Science and Engineering
The University of Delaware

"Synthesis and Characterization of Glucose-Responsive Microgels and Nanoshells"
Professor Shuiqin Zhou (zhoush@mail.csj.cuny.edu)
Department of Chemistry
The City University of New York – The College of Staten Island

"Highly Conductive Carbon Nanotube Composite Networks for Flexible Electronics and Biosensors"
Professor Huixin He (Huixinhe@newark.rutgers.edu)
Department of Chemistry
Rutgers University Newark Campus

"Development of Nanofiber Membranes to Improve Medical Surgery"
Dr. Dufei Fang (dfang@notes.cc.sunysb.edu)
Stonybrook Technology and Applied Research (STAR), Inc

8/9 (Thu) 4:00 pm – 5:30 pm : Technical Session T7 – Bioinformatics & Systems Biology (II): Informatic Approaches for Proteomics

Chair: Professor Hongzhan Huang (hh42@georgetown.edu), Georgetown University
Room: Friend Center 305

"*Integrated Data Appliances for Proteomics*"
David Chiang (david@SageNResearch.com)
Chairman & CEO, Sage-N Research, Inc.

"Tools and Resources for Alternative Splicing"
Professor Hongfang Liu (hl224@georgetown.edu)
Department of Biostatistics, Bioinformatics, and Biomathematics
Georgetown University Medical Center

"*iProXpress System for Proteomic Data Analysis*"
Professor Hongzhan Huang (hh42@georgetown.edu)
Department of Biochemistry and Molecular & Cellular Biology
Georgetown University Medical Center

8/9 (Thu) 4:00 pm – 5:30 pm : Technical Session T8 – C4I (II)

Chair: Dr. Wei-Hsing Wang (wangwh@att.net), NicheUSA, LLC
Room: Friend Center 306

Paula Vitakis (pvitakis@njstatelib.org)
NJKI Consultant, New Jersey State Library

Professor Robert J. Lackie (rlackie@rider.edu)
Rider University

Dr. Wei-Hsing Wang (wangwh@att.com)
President, NicheUSA, LLC

8/9 (Thu) 4:00 am – 5:30 pm : Technical Session T9 – Emerging Energy Technology (II)

Chair: Dr. Lin-Wen Hu (**lwhu@mit.edu**), Associate Director for Research Development and Utilization at the MIT Nuclear Reactor Laboratory (NRL)
Room: Friend Center 307

"Nuclear Engineering Education and Research at NTHU"
Professor Keh-Chyang Leou (kcleou@ess.nthu.edu.tw)
Engineering and System Science Department, National Tsing Hua University
Professor Chin Pan (cpan@ess.nthu.edu.tw)
Dean of College of Nuclear Science, National Tsing Hua University

"Applications of Nanofluids to Improve Economics and Safety of Light Water Reactors"
Dr. Lin-Wen Hu (lwhu@mit.edu)
Associate Director for Research Development and Utilization at the MIT Nuclear Reactor Laboratory (NRL)

"Fuel Cell to Serve as Emergency and Standby Power for Critical Loads"
Professor Wei-Jen Lee (lee@exchange.uta.edu)
Director of Energy Systems Research Center
Department of Electrical Engineering, the University of Texas at Arlington

8/9 (Thu) 4:00 pm – 5:30 pm : Technical Session T10 – System-on-Chip (II)

Chair: Professor Zhijie Shi (zshi@engr.uconn.edu), the University of Connecticut
Room: Friend Center 110

"Reconfigurable Hardware for Active Storage Networks"
Professor John Chandy (john.chandy@uconn.edu)
Department of Electrical and Computer Engineering, University of Connecticut

"Towards the Ideal On-Chip Interconnection Fabric"
Professor Li-Shiuan Peh (peh@ee.princeton.edu)
Department of Electrical Engineering, Princeton University

"Exploring Application-specific Instruction Set Processors for Security and Reliability Enhancement"
Professor Yunsi Fei (yfei@engr.uconn.edu)
Department of Electrical and Computer Engineering, University of Connecticut

8/9 (Thu) 4:00 pm – 5:30 pm : Business Session B2 – US Pharmaceutical Markets

Chairs: Dr. Ming Tong (ming.tong@pfizer.com), Medical Director, Pfizer and Dr. Tsang-Bin Tzeng (tsang-bin.tzeng@astrazeneca.com), Senior Director, AstraZeneca Pharmaceutics
Room: Friend Center 203

"*2006 Pharmaceutical Marketing Review*"
Dr. Jun Huangpu (jhuangpu@prismpharma.com)
Director of Customer Service, Verispan Consulting

"*How To Market an International Brand in North America OTC Market*"
Dahai Guo (dahaiguo@yahoo.com)
Director of Marketing, Inverness Medical Nutritionals Group

"Embracing Challenges: Changing Paradigm for New Drugs in US Pharmaceutical Market"
Dr. Kai Li (Kai2005li@gmail.com)
Associate Director, Worldwide Strategic Marketing, Johnson& Johnson

8/9 (Thu) 7:00 pm – 9:00 pm : Dinner (Invited guests only)

Host: Investment & Trade Office, Taipei Economic and Cultural Representative Office in the United States (investny@msn.com)

After Banquet Speech:

"Bridging Worlds through Science"
Professor Ruby B. Lee (rblee@princeton.edu)
Forrest G. Hamrick Professor of Engineering and Professor of Electrical Engineering and Director, Princeton Architecture Lab for Multimedia and Security
Princeton University

Day 2 (Friday, August 10, 2007)

8/10 (Fri) 8:00 am - 9:00 am : Registration

Room: Atrium, Computer Science 104

8/10 (Fri) 9:00 am – 10:45 am : University Leader's Forum (Panel)

Chair: Dr. Da Hsuan Feng (fengd@utdallas.edu), the University of Texas at Dallas
Room: Friend Center 101

Dr. Leonard C. Feldman (leonard.c.feldman@vanderbilt.edu)
Vice President for Physical Science & Engineering
Partnerships/Director of Institute for Advanced Materials, Devices, and Nanotechnology, Rutgers University

Dr. Way Kuo (way@utk.edu)
University Distinguished Professor & Dean of Engineering
The University of Tennessee

Dr. Michael Lai (michlai@gate.sinica.edu.tw)
President, National Cheng Kung University

Dr. James Wei (jameswei@princeton.edu)
Professor of Chemical Engineering, Pomeroy and Betty Perry Smith Professor of Engineering and Emeritus Dean of Engineering and Applied Science of Princeton University

Dr. Fujia Yang (fjyang23@yahoo.com)
Chancellor, the University of Nottingham, United Kingdom and
Former President of Fudan University, China

8/10 (Fri) 10:45 am - 11:00 am : Break

Host: Investment & Trade Office, Taipei Economic and Cultural Representative Office in the United States (TECRO)
Room: Atrium, Friend Center 101

Parallel Sessions:
8/10 (Fri) 11:00 am – 12:30 pm : Technical Session T11 – Nanotechnology (III)

Chair: Professor Jing-Tang Yang (jtyang@pme.nthu.edu.tw), National Tsing Hua University
Room: Friend Center 304

"On the Accuracy of the Spring Constant of Atomic Force Microscopy Cantilevers"
Professor Meng-Kao Yeh (mkyeh@pme.nthu.edu.tw)
Department of Power Mechanical, National Tsing Hua University

"Synthesis of metal nano-particle using an electron beam reduction method for proton exchange membrane fuel cells (PEMFC)"
Professor Fuh-Sheng Shieu (fsshieu@dragon.nchu.edu.tw)

Department of Materials Engineering
National Chung Hsing University

"The Physical Property and Nano-structural Analyses on Semiconductor and Conductor Nanowire"
Professor Ji-Jung Kai (jjkai@ess.nthu.edu.tw)
Department of Engineering and System Science
National Tsing Hua University

"Functional Nanomaterials for Theranostic Applications"
Professor Dar-Bin Shieh (dshieh@mail.ncku.edu.tw)
Institute of Oral Medicine and Institute of Basic Medical Sciences
Center for Micro/Nano Science and Technology
National Cheng Kung University Medical Center

8/10 (Fri) 11:00 am – 12:30 pm : Technical Session T12 – Bioinformatics & Systems Biology (III): Bioinformatic Approaches for Cancer Biology

Chair: Professor Fang Liu (fangliu@cabm.rutgers.edu), Rutgers University
Room: Friend Center 306

"Development of a Normalization Algorithm for Array Comparative Genomic Hybridization (aCGH)"
Professor Eric Y. Chuang (chuangey@cc.ee.ntu.edu.tw)
Department of Electrical Engineering, National Taiwan University

"Genomic Gain of 8q22 Activates Metadherin and Promotes Chemoresistant Metastasis of Poor-Prognosis Breast Cancer"
Professor Yibin Kang (ykang@princeton.edu)
Department of Molecular Biology, Princeton University

"Technologies for Understanding How We Get Cancer and Why It Has Been So Difficult to Cure"
Professor Carlo Maley (cmaley@wistar.org)
Molecular and Cellular Oncogenesis Program
Systems Biology Division, The Wistar Institute

"Upregulation of lymphocyte-associated genes marks a good prognosis subset of HER2+ breast cancers"
Professor Shridar Ganesan (ganesash@umdnj.edu)
Departments of Medicine and Pharmacology
The Cancer Institute of New Jersey and the Robert Wood Johnson Medical School, UMDNJ

8/10 (Fri) 11:00 am – 12:30 pm : Business Session B3 – Start-Up Clinic

Chair: Samuel S. Wu, MD PhD (Samuel.Wu@svlsa.com), Principal, SV Life Sciences
Room: Friend Center 203

Company presenters:

David Wang (wangdxy@yahoo.com), MD MBA
CEO and Co-Founder, New York Orthopedics

Rong (Ron) Liu (Ron.liu@austarpharma.com), PhD MBA
President and CEO, AustarPharma

Venture capital panel:

Karen Hong (karenh@proquestvc.com), PhD
Principal, ProQuest Investments

Phillip Chan (phillip@njtcvc.com), MD, PhD
NJTC Venture Fund

4th VC representative TBA

8/10 (Fri) 12:30 pm - 1:30 pm : Lunch

Room: Atrium, Computer Science 104

8/10 (Fri) 1:30 pm - 3:45 pm: Plenary (Business) Session P2: Emerging Financial Services

Chair: Professor Ren-Raw Chen (rchen@rci.rutgers.edu), Rutgers University and
Professor Shin-Yi Chou (syc2@lehigh.edu), Lehigh University
Room: Friend Center 101

Dr. Paul Bennett (pbennett@nyse.com)
Chief Economist, Research and
Senior Vice President, New York Stock Exchange

Professor Yangru Wu (yangruwu@andromeda.rutgers.edu)
Department of Finance and Economics and Director of Quantitative Finance Program
Rutgers Business School-Newark and New Brunswick, Rutgers University.

Dr. Dunmu Zi (dunmuj@hedgesys.com)
Hedge Systems Inc.

8/10 (Fri) 3:45 PM - 4:00 pm : Break

Room: Atrium, Friend Center 101

Parallel Sessions:
8/10 (Fri) 4:00 pm – 5:30 pm : Technical Session T13 – Nanotechnology (IV)

Chair: Professor Christopher Li (chrisli@drexel.edu), Drexel University
Room: Friend Center 304

"*The potential anticancer effects of electronegative LDL, a biological nanoparticle*"
Professor Chu-Huang Chen (cchen@bcm.edu)
Clinical Director, Behavioral Medicine Research Center
Baylor College of Medicine

"A Liquid Crystalline n-type Semi-conducting Dye with Crystalline p Stacks"
Professor Shi Jin (jin@mail.csi.cuny.edu)
Department of Chemistry
College of Staten Island and the Graduate Center
The City University of New York

"Synthesis, Self-assembly and Integration of Multisegment Nanowires"
Professor Zhiyong Gu (zhiyong_gu@uml.edu)
Department of Chemical Engineering and
CHN/NCOE Nanomanufacturing Center
University of Massachusetts Lowell

"Microstructures of Carbon Nanotubes"
Professor Bingqing Wei (weib@udel.edu)
Department of Mechanical Engineering
University of Delaware

8/10 (Fri) 4:00 pm – 5:30 pm : Technical Session T14 – Bioinformatics & Systems Biology (IV): High-Throughput Genotyping Studies

Chair: Professor Mingyao Li (mingyao@mail.med.upenn.edu), University of Pennsylvania
Room: Friend Center 306

"Genome wide association studies - the current revolution in disease gene discovery"
Dr. Struan F.A. Grant (grants@chop.edu)
Associate Director, Center for Applied Genomics
Abramson Research Center, the Children's Hospital of Philadelphia

"Efficient Use of Family Data in Genome-Wide Association Scans"
Dr. Wei-Min Chen (wechen@umich.edu)
Center for Statistical Genetics, University of Michigan

"High-resolution copy number variation detection via SNP genotyping"
Dr. Kai Wang (kai@mail.med.upenn.edu)
Department of Genetics, University of Pennsylvania

8/10 (Fri) 4:00 pm – 5:30 pm : Technical Session T15 – Nanotechnology (V)

Chair: Dr. Je-Luen Li (jlli@pub.iams.sinica.edu.tw), Academia Sinica
Room: Friend Center 307

Dr. Peter Galajda (pgalajda@princeton.edu)
Department of Physics, Princeton University

"Theoretical Study of the Raman Spectra of Graphite Oxide Models, and Comparison with the Experiment."
Dr. Konstantin N Kudin (kkudin@princeton.edu)
Department of Chemistry, Princeton University

"Self-Organization and Self-Healing — Study and Design of Materials at the Molecular"
Dr. Hannes Schniepp (schniepp@princeton.edu)
Department of Chemical Engineering, Princeton University

8/10 (Fri) 4:00 pm – 5:30 pm : Business Session B4 – Getting Started: To Be a Life Science Entrepreneur
Chair: Phillip P. Chan, MD, PhD (phillip@njtcvc.com), Partner, NJTC Venture Fund
Room: Friend Center 203

Han Cao (han@bionanomatrix.com), PhD
Founder, BioNanomatrix

Jie Yao (jieyaohawkeye@yahoo.com), PhD
CEO, Hawkeye Vision

Joseph Huang (jhuang@microdysis.com), PhD
CEO, MicroDysis

Paul Guo (gpaul@astatechinc.com), PhD
President and CEO, AstaTech

8/10 (Fri) 7:00 pm – 9:00 pm : Dinner (Invited guests only)
Host: Science & Technology Division, Taipei Economic and Cultural Representative Office in the United States

Abstracts and Biographies

General Conference Chairs

Li-Shiuan Peh

Assistant Professor of Electrical Engineering
Princeton University
peh@ee.princeton.edu

BIOGRAPHY

Li-Shiuan Peh has been an Assistant Professor of Electrical Engineering at Princeton University since 2002. She graduated with a Ph.D. in Computer Science from Stanford University in 2001, and a B.S. in Computer Science from the National University of Singapore in 1995. Her research focuses on low-power interconnection networks, on-chip networks and parallel computer architectures, and is funded by several grants from the National Science Foundation, the DARPA MARCO Gigascale Systems Research Center as well as Intel Corporation. She was awarded the Computing Research Association CRA-W Anita Borg Early Career Award in 2007, the Sloan Research Fellowship in 2006, and the NSF CAREER award in 2003.

General Conference Chairs

Eric Y Chuang

Department of Electrical Engineering, Graduate Institute of Biomedical Electronics and Bioinformatics, Department of Life Science, and Graduate Institute of Epidemiology
National Taiwan University
Taipei, Taiwan

Tel: 886-2-3366-3660, Fax: 886-2-3322-4179
Email: chuangey@cc.ee.ntu.edu.tw

BIOGRAPHY

Having been educated in cancer biology and with more than 20 years research training in biomedical sciences or related fields, Dr. Chuang possess a broad knowledge and extensive experience in biochip technologies, cancer biology, cell and molecular biology, toxicology as well as genetics. Currently, Dr. Chuang is an associate professor in the Medical Engineering Group of the Department of Electrical Engineering, National Taiwan University. Dr. Chuang is the first faculty member in the Department of Electrical Engineering with strong biomedical background. Dr. Chuang earned his Ph.D. from Harvard University in cancer biology with toxicology and molecular genetics as two sub-specialties and has more than eight years experience in biochip technologies for biomedical research. Being an expert of DNA microarray technologies, Dr. Chuang played an instrumental role in establishing microarray research projects at the US National Cancer Institute (NCI), National Institutes of Health (NIH). Dr. Chuang was the Head of Microarray Laboratory for Radiation Oncology Sciences Program at the NCI/NIH before joining National Taiwan University. When Dr. Chuang was an instructor of NCI Microarray Training Class, he trained more than 200 scientists from US NIH, FDA and CDC to conduct DNA microarray related research. Furthermore, Dr. Chuang has frequently been invited to national and international conferences (including the 92nd Annual Meeting of the American Association for Cancer Research) to share his expertise on DNA microarray technologies with colleagues all over the world. Over the years, Dr. Chuang has published many articles in the leading peer review journals, such as Radiation Research, Journal of Bacteriology, Journal of Virology, Bioinformatics, Cancer Research, Blood, PNAS, Cancer Cell, etc. Dr. Chuang's research is focusing on biochip technologies, bioinformatics and Cancer.

Technical Program Committee Chair

Benjamin S. Hsiao

Professor, Department of Chemiistry
The State University of New York at Stony Brook
Phone: (631) 632 7793
Fax: (631) 632 6518
Email: bhsiao@notes.cc.sunysb.edu

BIOGRAPHY

B.S., 1980, National Taiwan University; Ph.D., 1987, University of Connecticut; Postdoctoral Fellow, University of Massachusetts, 1987-1989; Scientist, DuPont Company, 1987-1997; Adjunct Associate Professor, University of Delaware, 1994-1997; Spokesperson, X27C (Advanced Polymers Beamline) and X3A2 Beamlines, National Synchrotron Light Source, Brookhaven National Laboratory 1997-; Guest Professor, Changchun Institute of Applied Chemistry, Chinese Academic of Sciences, 2000-; Editorial Advisory Board, Journal of Macromolecular Science- Physics, 1995, Journal of Polymer Research, 1995, High Performance Polymers, 1996; Chinese Journal and Applied Chemistry; Polymer, 2003; 1998 DuPont Young Professor Award; 2002 Fellow, American Physical Society.

Physical Chemistry,Polymer Physics and Materials Sciences

Polymers are long molecules having many unique properties different from metals and small-molecule liquids. They are widely used in our daily life in plastics, textile fibers and optical/medical devices. In my laboratory, we are interested in understanding the structural and morphological development and manipulation of complex polymer systems during preparation and processing in real time. The focus of our research projects is the design, preparation, characterization and application of nanostructured soft condensed materials, such as fibers (one-dimensional orientation), films (two-dimensional orientation) and bulk material systems (three-dimensional orientation), through precise control of molecular architecture and physical interactions including crystallization, molecular level mixing, deformation and flow. My current research

programs are as follows.

Polymer Crystallization Fundamentals We are studying the mechanisms of the early stages as well as the late stages of polymer crystallization from the melt. Recently, several new hypotheses have been proposed to explain the initial stages of crystallization, which challenge the conventional view of crystallization through nucleation and growth processes. For example, one hypothesis suggests that density or orientation fluctuations form first in the melt, particularly through the process of spinodal decomposition, which serve as a precursor to crystallization. Our research group has carried out several fundamental research projects to verify these hypotheses.

Orientation-Induced Crystallization The behavior of orientation-induced crystallization in polymers under flow and deformation has been investigated using in-situ X-ray techniques. We propose that molecular orientation affects the crystallization behavior of polymer melts in two different aspects: thermodynamic and hydrodynamic. The thermodynamic effect involves the reduction of entropy in oriented chains, which favors the formation of primary nuclei with small size and large density that are mainly responsible for the increase of crystallization rate. The hydrodynamic effect generates the landscape of molecular orientation in chains with different molecular weights, which is responsible for the resultant morphology such as shish, kebab or spherulite. Several on-going projects are designed to explore the underlying physics of this subject.

Polymer Nanocomposites We are developing varying chemical and physical pathways to disperse nanostructured molecules (such as polyhedral oligomeric silsesquioxane (POSS) and carbon nanotubes) and nanosize particles (layered silicates or clays) in the polymer matrix at the molecular level. We found that the structure, property and processing relationships are dramatically different in nanocomposites as compared to their neat resin counterparts.

Absorbable Polymers for Medical Applications, Drug Delivery and Tissue Engineering We have developed several unique processing techniques to fabricate nanostructured materials including (1) nonwoven membranes consisting of nanosize fibers, and (2) nanosize particles (10 - 500 nm). FDA-approved biodegradable polymers such as polyglycolide (PGA) and polylactide (PLA) homo- and copolymers are the base materials for forming the nanostructured scaffolds. The biodegradation rate as well as the drug (DNA and medicine) release rate are functions of fiber/particle size, morphology, porosity and chemical compositions, which can be precisely controlled by processing parameters. The major goal of this research is for medical applications, drug delivery and tissue engineering.

Synchrotron X-ray Scattering and Diffraction Technology Development One unique characterization tool developed in this laboratory is the simultaneous small-angle x-ray scattering (SAXS) and wide-angle x-ray diffraction (WAXD) technique using synchrotron radiation. Dedicated to polymer research, the Advanced Polymers Participating Research Team (AP-PRT) was formed in 1997 to develop a synchrotron X-ray scattering beamline (X27C) at the National Synchrotron Light Source, Brookhaven National Laboratory. This facility, the first of its kind in the U.S., was funded by Stony Brook (Prof. B. Chu and I are spokespersons), NSLS, NIST, NIH, AFRL and four industrial laboratories (General Electric, Allied Signals, Montell USA, Hoechst Celanese). The primary focus of this PRT is to investigate polymer structure, morphology and dynamics from atomic (1-20 Å) to microscopic scales (20 - 1000 Å) in real time and/or in-situ using simultaneous SAXS/WAXD techniques.

Conference Program Chairs

Jing-Tang Yang

Professor of Power Mechanical Engineering
National Tsing Hua University

Institute of Microelectromechanical Systems (Institute of Nanoengineering and Microsystems, 2007/08)
Email: jtyang@pme.nthu.edu.tw
Homepage: http://lab102b..pme.nthu.edu.tw/
Lab Homepage: http://lab102b..pme.nthu.edu.tw/

BIOGRAPHY

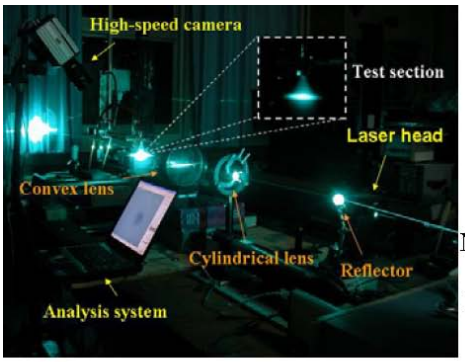
Dr. Yang received his Ph.D. in Mechanical Engineering Department from the University of Wisconsin at Madison in 1983. During the past 24 years at Tsing Hua, he conducted more than 100 funded projects and successfully established laboratories of Energy and Combustion (1983~), Jet Propulsion (1986~), Microfluidics (2002~), Biomimetic Engineering (2004~), and an AFM/SEM Laboratory for K-12 Nanotechnology Education Center (2003~). His current research topics contain bio-microfluidics, biomimetic engineering, energy utilization and combustion, jet propulsion, and laser diagnostics.

Dr. Yang has been the chairman of PME department (1997-2000), the director of Tzi-Chiang Science Research Center, the member in the board of directors of Automobile Research and Testing Center (2000-2006). Currently, he serves as

- Consultant in the steering team of energy policy and technology development (the Executive Yuan)
- Coordinator of the administration committee of Taiwan government projects on energy and atomic energy (National Science Council)
- General Director of nanotechnology human resource development program office (Ministry of Education)
- General coordinator of the reviewing committee of annual energy projects (over NTD 3 billion/year) (Energy Bureau, Economy Ministry)

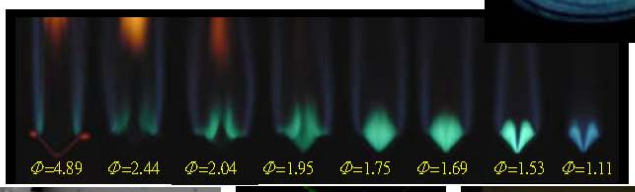
SELECTED RESEARCH PROJECTS:

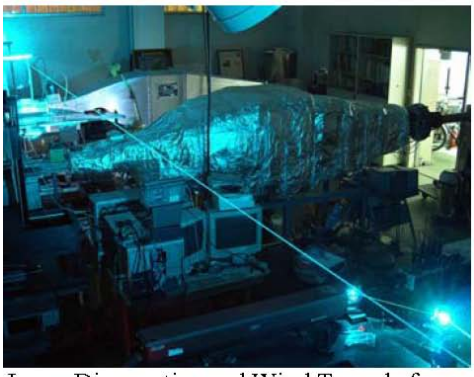
- Pico-liter Grade Total Analysis System for Proteins and Amino Acids
- Cutting, Transporting, Positioning, and Detection of Bio-Droplets:
- Microscale Multiphase Flow Mixing
- Biomimetic Mobilized Threat Micro-Alerters with Vision and Flight Sensors
- Novel Design and Microfluidic Analysis of Passive Micromixers
- Nanotechnology Human Resource Development Program
- Experimental and Numerical Analysis of Flame Stabilization in Multi-Ring
- Impinge Burners
- A Study of Low NOx Gas Burners with Distributed Equivalence Ratio
- Aerodynamic Characteristics of the Wind-Tunnel Type Power Generator
- Ignition and Flame Spread PMMA in a Soild-Fuel Ramjet Simulator
- Design of an Air Floating Table for Large-Sized Glass Substrate
- Biomechanics and Biomimetic Engineering on Fishes and Insects
- Internet Scanning Electron Microscopy for K-12 Education of Nanotechnology
- A Diagnosis Chip with Controllable Surface Wettability Fabricated by Self-Assembling Nanoparticles or Biomolecules (under review)



← Design, Micro-fabrication, and Testing of Micro-Atomizers

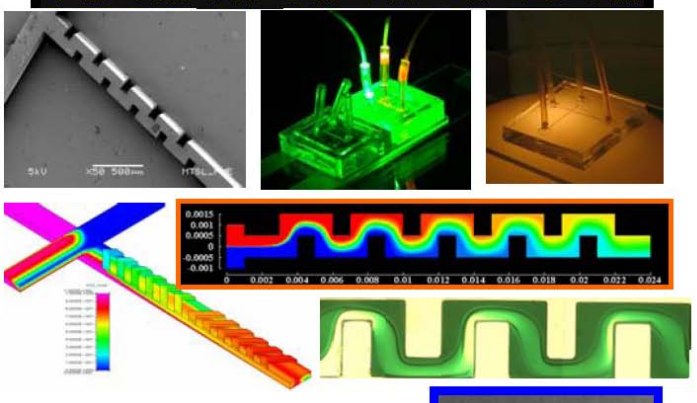
Flame Interactions



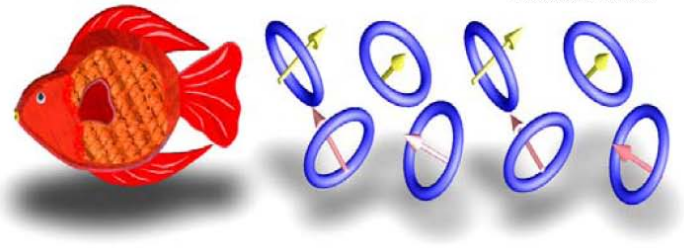


Laser Diagnostics and Wind Tunnels for Gas Burner Cooling and SFRJ Simulator

Design, Simulation, Experiments for Novel Micromixers



Swimming Patterns of Blood Parrot



Flapping-Wings Flight Japanese White-Eye and Dragonfly

SELECTED PUBLICATIONS :

1. J. T. Yang,* C. Chen, I. C. Hu, and P. C. Lyu, 2007, "Design of a Self-Flapping Microfluidic Oscillator and Diagnosis with Fluorescence Methods," *IEEE Journal of Microelectromechanical Systems (in press).*
2. K. W. Lin and J. T. Yang,* 2007, "Chaotic Mixing in a Planar Serpentine Channel," *International Journal of Heat and Mass Transfer,* Vol. 50, pp. 1269-1277.
3. L. Wang and J. T. Yang,* 2006, "An Overlapping Crisscross Micromixer Using Chaotic Mixing Principles," *Journal of Micromechanics and Microengineering,* Vol. 16, No. 12, pp. 2684-2691 *(selected in the JMM 2006 Highlights)*
4. L. Wang and J. T. Yang,* 2007, "The Flow Structure of an Overlapping Crisscross Micromixer," *Journal of Chemical Engineering Science,* Vol. 62, pp. 711-720.
5. J. T. Yang,* C. K. Chen, K. J. Tsai, W. Z. Lin, and H. J. Sheen, 2006, "The Novel Oscillator with Step-Shaped Reattachment Walls," *Journal of Sensors and Actuators-A: Physical* [in press].
6. J. T. Yang* and K. W. Lin, 2006, "Mixing and Separation of Two-Phase Flow in a Micro Planar Serpentine Channel," *Journal of Micromechanics and Microengineering,* Vol. 16, No. 11, pp. 2439-2448.
7. J. T. Yang, W. J. Ma, H. W. Wang, and G. L. Tsai, 2006, "Transitional Flow Patterns after a Backstep with Wall Mass Injection through a Porous Base," *International Journal of Heat and Mass Transfer* [accepted].
8. J. T. Yang, J. H. Chen, K. J. Huang, and J. A. Yeh, 2006, "Droplet Manipulation over a Hydrophobic Surface with Roughened Pattern," *Journal of Microelectromechanical Systems*, Vol. 15, June, pp. 697-707.
9. J. T. Yang, K. J. Huang, and Y. C. Lin, 2005, "Geometric Effects on Fluid Mixing in Passive Grooved Micromixers," *Lab on a Chip,* Vol. 5, pp. 1140-1147.
10. J. T. Yang, K. J. Huang, and A. Chen, 2004, "Microfabrication and Laser Diagnosis of Pressure-Swirl Micro Atomizers," *Journal of Microelectromechanical Systems*, Vol. 13, pp. 843-850.
11. J. T. Yang, C. H. Yang, C. Y. Chen, and D, J, Yao, 2007, "Conversion of Surface Energy and Manipulation of Single Droplet across Micro Textured Surfaces," submitted to *Journal of Analytical Chemistry.*
12. J. T. Yang and S. J. Ding, 2007, "The Topology-Based Wake Structure and Locomotor Function of Vertical Caudal Fin-Wave Propagation in *Cichlasoma citrinellum XC.synspilum*," submitted to *J. Experimental Biology*.
13. J. T. Yang, J. C. Lee, and H. C. Cheng, 2007, "An Experimental Study of Combustion Characteristics of the Oblique Impinging-Type Burner," *submitted to Combustion and Flame*.

Selective Patents:

1. J. T. Yang, W. Z. Lin, K. J. Tsai, and K. J. Huang, 2004, "Fluidic Oscillator," US Patent No. 10/769,627.
2. J. T. Yang, J. H. Chen, A. C. Chen, K. J. Huang, 2005, "Micro Valve Device," US Patent 2005/0045238 A1 (Filed on August 27, 2004; Application Publication on March 3, 2005).
3. C. S. Yu, Y. C. Hu, H. Y. Chou, C. J. Chen, J. T. Yang, J. H. Chen, 2005, "Control Device and Method for Controlling Liquid Droplets," US Patent 2005/0045539 A1 (March 3, 2005).

4. 4. S. C. Yuan, J. T. Yang, J. A. Yeh, C. S. Yu, Y. C. Hu, C. J. Chen, 2005, "Electrowetting Electrode Device with Electromagnetic Field for Actuation of the Magnetic-Beads Biochemical Detection System," US Patent 2005/0056569 A1 (Application Publication on March 17, 2005).
5. C. S. Yu, Y. C. Hu, M. Y. Lin, H. Y. Chou, C. J. Chen, S. C. Yuan, J. T. Yang, 2005, "Biochemical Detecting Device for Magnetic Beads and Methods Using the Same," US Patent 2005/0036908 A1.
6. Y. Y. Li, C. L. Cheng, Y. D. Huang, D. B. Hsiung, L. M. Liu, and J. T. Yang, 2005, "A Knocking-Based Micro Combustion Engine and Related Electricity Components," ROC Patent No. I234898.
7. K. J. Huang, J. T. Yang, and C. A. Chen, 2006, "The Micromixer with Saddle Point Modulation," ROC Patent (Publication No. 200600185; on 2006/01/01; US Patent, pending).
8. J. T. Yang, C. Y. Chen, T. H. Yang, and A. C. Chen, 2006, "Microfluidics Device for Separation and Transportation," ROC Patent No. I261572/US Patent Pub. No. US 2007/0034270 A1.
9. 9. J. T. Yang and L. Wang, and K. J. Huang, 2006, "Micromixer with Overlapping-Crisscross Entrance," ROC Patent No. I230683/US Patent Pub. No. US 2005/0232076 A1, Oct. 20, 2005.
10. 10. C. H. Ho, S. Y. Chen, J. T. Yang, and C. K. Chen, 2006, "Composite Plate Device for Thermal Transpiration Micropump," US Patent Pub. No.: US 2006/0147741 A1, July 6, 2006 (Foreign Application Priority Data: 2004/12/30).
11. J. T. Yang and K. W. Lin, 2006, "A Serpentine Micromixer Incorporated with Alternating Expansion-Convergent Patterns," US Patent Pub. No. US 2006/0285433 A1, Dec 21, 2006.
12. J. T. Yang, C. Y. Chen, T. H. Yang, and A. C. Chen, 2006, "Microfluidics Device for Separation and Transportation," US Patent Pub. No.: US 2007/0034270 A1, Feb 15, 2007 (File No. 11/462,002, 95/8/2).

Submitted Papers and Patents:

1. J. T. Yang, C. H. Yang, C. Y. Chen, and D, J, Yao, 2006, "Conversion of Surface Energy and Manipulation of Single Droplet across Micro Textured Surfaces," submitted to *Journal of Analytical Chemistry..*
2. J. T. Yang, H. W. Wang, Y. F. Lin, Y. C. Lin, and Y. C. Su, 2006, "Cooling Transients in a Sudden-Expansion Channel with Varied Rates of Wall Transpiration," submitted to *International Journal of Heat and Mass Transfer*.
3. J. T. Yang, C. A. Chen, K. J. Huang, and H. J. Sheen, 20076, "LDV Measurement of Particle Dispersion in Turbulent Two-Phase Flow over a Backstep," submitted to *J. Multiphase Flow*.
4. J. T. Yang, K. J. Huang, and K. Y. Tung, 2007, "A Chaotic Micromixer Modulated by Constructive Vortices Agitation," submitted to *J. Micromechanics and Microengineering*.
5. J. T. Yang and W. F. Fang, K. Y. Tung, and L. Wang, 2007, "A Passive Micromixer Enhanced by Connected Grooves across Adjacent Walls," submitted to *J. Chemical Engineering Science..*
6. J. T. Yang, A. C. Chen, and D. Y. Kuo, 2007, "Design and Performance Analysis of Novel Micro-Atomizers Assisted with Air Swirler," submitted to *J. Multiphase Flow*.
7. J. T. Yang and S. J. Ding, 2007, "The Topology-Based Wake Structure and Locomotor Function of Vertical Caudal Fin-Wave Propagation in *Cichlasoma citrinellum XC.synspilum (Bloody Parrot Fish)*," to be submitted to *J. Experimental Biology*.

8. J. T. Yang, J. C. Lee, and H. C. Cheng, 2007, "An Experimental Study of Combustion Characteristics of the Oblique Impinging-Type Burner," *submitted to Combustion and Flame.*
9. J. T. Yang,* S. J. Ding, C. Y. Lee, and Z. F. Kuo, 2007, "Unsteady Propulsion Patterns and Efficiency Evaluation of A Biomimetic Deformable Caudal Fin," to be submitted to *J. Physics of Fluids.*
10. J. T. Yang,* C. Chen, and K. J. Tsai, "Microfluidic Oscillator," US Patent (pending)
11. J. T. Yang,* K. J. Huang, K. Y. Tung, and W. F. Fang, 2006, "A Circulation Disturbance Micromixer," US Patent (pending).
12. J. T. Yang,* D. Y. Kao, A. C. Chen, 2007, "Design of Air-Assisted Atomizers with Swirling Air," ROC Patent (pending).
13. D. B. Shieh, J. T. Yang,* Y. H. Hsiao, T. H. Yang, 2007, "A Novel Method of Self-Assembling Nanoparticles or Long-Chain Molecules for the Formation of Surfaces with Controllable Wettability," ROC Patent and US Patent, pending (File No. 096114774, 2007/04/26)..
14. J. T. Yang,* D. B. Shieh, C. Y. Chiu, W. F. Fang, Y. M. Chang, and Y. L. Chen, 2007, "A Novel Method and Control Devices for Droplet Manipulation and Detection by Biomolecule Self Assembly," ROC Patent and US Patent, pending (File No. 096114773, 2007/04/26).
15. J. T. Yang,* D. B. Shieh, T. H. Yang, W. F. Fang, Y. L. Chen, Y. M. Chang, 2007, "A Novel Method and Control Devices for Changing Wettability on Solid Surface by Electric or Magnetic Field," ROC Patent and US Patent, pending. (File No. 096114772, 2007/04/26).

行政院國家科學委員會計畫主持人資料表

(一) 基本資料

文姓名	楊鏡堂	英文姓名	Yang (Last Name)	Jing -Tang (First Name) (Middle Name)
國籍	中華民國	性別	;男	出生 1952 年
住宅地址	(300) 新竹市光明里 8 鄰光復路二段清華大學西院 50 號 5 樓		電話	(03) 572-1742
服務機關名稱	國立清華大學動力機械工程學系		電話	(03) 574-2916, 0936333218
服務機關地址	(300)新竹市光復路二段 101 號清華大學動力機械工程學系工程一館 619 室		傳真	(03) 572-4242
			E-mail	jtyang@pme.nthu.edu.tw

(二) 主要學歷請填學士級以上之學歷或其他最高學歷均可，若仍在學者，請在學位欄填「肄業」。

畢業學校	國別	主修學門系所	學位	起訖年月
威斯康辛大學麥迪生校區	美國	機械工程(Minor: 化工系)	博士	1979/09 至 1983/08
國立成功大學	中華民國	機械工程	碩士	1976/08 至 1978/06

國立成功大學	中華民國	造船工程	學士	1970/08 至 1974/06

(三)現職與經歷。

務機關	服務部門	職稱	起訖年月
現職：國立清華大學	動力機械工程學系	教授	1990/08 至今
	微機電系統工程研究所	合聘教授	2002/08 至 2007/07
	奈米工程與微系統研究所	合聘教授	2007/08 至今
服務：行政院	能源政策及科技發展指導小組	諮詢委員(學界代表一人)	2004/10 至今
國家科學委員會	政府科技計畫能源領域	召集人	2004/08 至今
國家科學委員會	中央政府科技發展計畫審議作業	智庫委員(能源、原子能)	2007/01 至 2009/12
國家科學委員會	前瞻優質生活環境專案深耕計畫	共同主持人	2006/08 至 2007/07
奈米國家型科技計畫	全國奈米科技人培計畫推動辦公室	主持人	2007/01 至今
教育部	中北區奈米科技 K-12 教育發展中心	主任	2003/08 至 2006/12
國家科學委員會	能源與環境重點領域規劃計畫	共同主持人	2005/06 至 2006/08
車輛研究測試中心	董事會	董事	1999/10 至 2005/09
行政院	全國能源會議	引言人	2005/01 至 2005/06
經濟部能源局	能源科技研究發展白皮書	編審委員	2005/03 至 2007/12
國立清華大學	校務監督暨經費稽查	委員會委員兼召集人	2002/10 至 2004/09
國立清華大學	動力機械工程學系	系主任	1997/05 至 2000/07
國立清華大學	自強科學研究中心	主任/計畫處處長	1993/08 至 1996/08
新竹縣/市政府	火災鑑定委員會	委員	1988/07 至今

(四) 學門專長

名 稱	微奈熱流系統	燃燒與能源	噴射推進	生醫熱流	兩相流場

(六) 近年之授課內容：奈微尺度熱流學、生醫微熱流、熱對流、流體力學、實驗熱流學、燃燒學

(七) 學術榮譽：

1. 1990, 1991, 1993, 1994 四年度國科會優等研究獎
2. 1998-1999 年國科會傑出研究獎
3. Tsing Hua Fellowship (1992~1995)
4. 內政部消防署二等三級榮譽消防獎章 (1996)

5. 中國機械工程學會傑出工程教授獎 (2000)

6. 2004 年第一屆上銀科技機械碩士論文獎銅質獎 (陳佳惠楊鏡堂, 平分獎金 40 萬元)

7. 2004 年第一屆上銀科技機械碩士論文獎佳作獎 (袁士駿楊鏡堂, 平分獎金 10 萬元)

8. 第二十九屆全國力學會議論文委員會主任委員

9. 第一屆兩岸能源與環境永續發展科技研討會大會邀請講席, "能源與環境研發規劃," 2005 年 10 月

10. 第 22 屆全國機械工程研討會大會邀請講席, “Mixing and Transport in Microfluidic Systems,” 2005 年 11 月

11. 新竹市國中自然科學輔導團科普專題演講, "蓮花效應暨工程應用," 12 月

12. 國立東華大學奈米講座蓮花效應與表面張力 (20060610)

13. 第二屆兩岸能源與環境永續發展科技研討會 Keynote Speech 主持人 (20060805)

14. The Executive Committee, The 8th Asia-Pacific International Symposium on Combustion and Energy Utilization (8th APISCEU), Sochi, Russia (20061010-12)

15. 2006 Asia Nano Forum-Education & Talent Cultivation Workshop (invited talk, 20060928).

16. 能源暨熱流學門研究發展規劃— 再生能源規劃與演講 (20061027)

17. Taiwan-Japan Bilateral Symposium on Research and Education of Nanotechnology, Tokyo (訪問團團長及 Opening Speech; 20061101)

18. The Executive Committee, The Seventh International Symposium on Special Topics in
Chemical Propulsion (7-ISICP), Kyoto, Japan, 17-21 September 2007.

19. Invited Speaker, the 17th IKETANI International Conference on "Dreams, Creation and
Realization of Materials Saving the Humankind," Tokyo, Japan, Sep. 5-8, 2007.

20. T**he Journal of Micromechanics and Microengineering 2006 Highlights** (精選論文); {*“The*

articles selected received the highest praise from the international referees, and the highest number of downloads from the journal's website. Comprising 25 articles, the collection provides a taste of the content published in the journal.”}
L. Wang and J. T. Yang,* **2006**, ***Journal of Micromechanics and Microengineering,*** Vol. 16, No. 12, pp. 2684-2691 [SCI IF=2.50, ranked **4/110** (top 3.6%) in Mechanical Engineering].

21. 2007 年中國工程師學會傑出工程教授獎 (即將公佈並頒獎).

(八) 教學與學術研究成果：

1. 指導研究生論文, 榮獲國內外論文獎 57 項 (一項國際研討會金牌、八項全國第一)。

2. 指導博士班研究生 26 人, 其中 14 位已完成論文並獲得博士學位。

3. 指導碩士班研究生 76 人, 其中 71 位已完成論文並獲得碩士學位。

4. 主持專題研究計畫 102 個, 完成專題研究報告 95 份。

5. 與陳文華教授、廖俊臣教授共同規劃/爭取經費/執行高能材料燃燒實驗室(NTD189,000,000) 。

6. 發表期刊論文五十餘篇(含燃燒、微機電、熱流領域第一流期刊; 投稿中 10 篇) , 中美專利 46 件(含申請中 10 件) , 會議論文 97 篇, 專題報導 11 篇, 科普專書 8 本。

Conference Program Chairs

Kai Li

Professor, Department of Computer Science
35 Olden Street
Princeton University
Princeton, New Jersey 08544
Phone: (609) 258-4637
FAX: (609) 258-1771
Email: **li at cs dot princeton dot edu**

BIOGRAPHY

Education

- Ph.D. 1986, Yale University. Yale Fellowships.
  Dissertation: *Shared Virtual Memory on Loosely Coupled Multiprocessors*.
  Advisers: Paul Hudak and Alan Perlis.
- M.S. 1983, M.Phil. 1984, Yale University.
- M.S. 1981, University of Science and Technology of China, Peking, P.R.C.
- B.S. 1977, Jilin University, Changchun, P.R.C. Graduate with high honors.

Research Interests

- Distributed and parallel systems, content-based search, operating systems, networking, data protection, storage systems, and scalable display and data visualization systems.

Professional Experience

Full Time

- Charles Fitzmorris Professor, Department of Computer Science, Princeton University, since 2002.
- Professor, Department of Computer Science, Princeton University, 1995-2001.
- Associate professor, Department of Computer Science, Princeton University, 1992-1995.
- Assistant professor, Department of Computer Science, Princeton University, 1986-1992.

Visiting and Consulting

- Honorary visiting professor, Tsinghua Univesity, since 2005.
- Honorary visiting professor, Institute of Computing Technology, Chinese Academy of Sciences, since 2005.
- Chief Scientist and Board Director, Data Domain, Inc., since 2002.
- Chief Technology Officer, Treasurer and Board Director, (while on leave from Princeton) 2001-2002.
- Entrepreneur-In-Resident, New Enterprise Associates, fall 2001.
- Honorary Visiting Professor, Institute of Software, Academy of Sciences of China, since 2001.
- Visiting Professor, Department of Computer Science, Stanford University, 2000.
- Visiting Professor, Department of Computer Science, Stanford University, 1996.
- Consultant, Intel Microcomputer Research Labs, since 1996.
- Consultant, AT\&T Bell Laboratories, summer 1995.
- Consultant, NEC Research Institute, since 1994.
- Consultant, Matsushita Information Technology Laboratory, 1991-94.
- Consultant, DEC Systems Research Center, 1989.
- Consultant, Intel Supercomputer Systems Division, 1987.
- Visiting assistant professor, Department of Electrical Engineering and Department of Computer Science, University of Toronto, Fall 1988.
- Visiting scientist, DEC Systems Research Center, summer 1987 and 1988.

Honors and Awards

- Commendation List for Outstanding Teaching, School of Engineering and Applied Science, Princeton University, 2006.
- Honorary visiting professor, Tsinghua Univesity, since 2005.
- Honorary visiting professor, Institute of Computing Technology, Chinese Academy of Sciences, since 2005.
- Authored one of the 50 most-influential papers in *20 Years of PLDI –A Selection (1979-1999)*, 2004.
- Authored one of the 43 most-influential papers in *25 Years of the International Symposia on Computer Architecture.* 1998.
- IBM Partnership Award, 1998 and 2000.
- ACM Fellow, 1998.
- *ACM Measurement and Modeling of Computer Systems* Best Paper Award, ACM, 1995.
- Excellence in Teaching Award, Undergraduate Engineering Council, Princeton University, 1994.

Advisory Boards

- Advisory board member, School of Computer and Communication Sciences (I&C), Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, since 2004.
- Advisory board member, Computer Science Department, Hong Kong University of Science and Technology, Hong Kong, since 2004.
- Advisory board member, TeraGrid Technical Advisory Board, Argonne National Labs, NCSA and UCSD Supercomputing Center, 2002-2004
- Advisory board member, Board of Advisory council, Intel Microcomputer Technology Labs, 2000-2004.
- Advisory board member, DOE Plasma Sciences Advanced Computing Institute (PSACI), since 1999.
- Oversea Expert Committee member, Chinese Academy of Sciences, People's Republic of China, since 1999.

University Services

- Member, Committee on Internationalization, 2007.
- Chair, Faculty Advisory Committee on Athletics, Princeton University, since 2006.
- Member, Award Nomination Committee, School of Engineering and Applied Science, Princeton University, since 2006.
- Member, Faculty Advisory Committee on Athletics, Princeton University, since 2005.
- Member, University Research Board, Princeton University, since 2004.
- Executive committee member, Princeton Institute for Computational Sciences, since 2003.
- Member, Council of Princeton University Community, 1998-2000.
- Member, Fellowship committee, School of Engineering and Applied Science, Princeton University, 1997, 1998, and 2003.

Professional Services

- Panel Member, Research Assessment Exercise (RAE), University Grants Committee, Hong Kong, 2006.
- Member, Committee of Visitors, National Science Foundation, 2005.
- Member, Evaluation Committee, Ministry of Science and Technology, China, 2005.
- Member, Evaluation Committee, Chinese Academy of Sciences, China, 2005.
- Editorial board member, *International Journal of Parallel Programming*, since 1993.
- Associate Editor, *IEEE Transactions on Parallel and Distributed Systems*, 1994-97.
- Guest Editor, Special Issue on "Large-Format Displays," *IEEE Computer Graphics & Applications*. July 2000.
- Editorial board member, Journal of Software, since 2001.
- Editorial board member, International Journal of Security and Networks, since 2005.

- Co-general chair, ACM/IEEE International Symposium of Computer Architecture, 2008.
- Program committee member, IEEE International Symposium on High Performance Computer Architecture, 2008.

- Program committee member, ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems, 2007.
- Program committee member, ACM SIGOS Eurosys Conference, 2007.
- Program committee member, ACM Workshop on Continuous Archival and Retrieval of Personal Experiences, 2006.
- Program committee member, IEEE International Symposium on High Performance Computer Architecture, 2006.
- Program committee member, IEEE International Parallel and Distributed Processing Symposium, 2006.
- Program committee member, ACM International Conference on Computing Frontiers, 2006.
- Co-general chair, IEEE High Performance Computing Asia, 2005.
- Program committee member, USENIX Conference on File And Storage Technology (FAST), 2005.
- Program committee member, ACM Workshop on Continuous Archival and Retrieval of Personal Experiences, 2005.
- Program committee member, IEEE Workshop on Remote Direct Memory Access, 2005.
- Co-program committee chair, ACM/IEEE Symposium on Architecture for Networking and Communications Systems, 2005.
- Program committee member, ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems, 2005.
- Steering committee member, ACM/IEEE International Symposium of Computer Architecture, 2004.
- Program committee member, ACM Workshop on Continuous Archival and Retrieval of Personal Experiences, 2004.
- Program committee member, IEEE Workshop on Remote Direct Memory Access, 2004.
- Program committee chair, ACM/IEEE International Symposium of Computer Architecture, 2003.
- Program committee vice chair, ACM Supercomputing conference, 2002
- Program committee member, ACM International Conference on Architectural Support for Operating Systems and Programming Languages, 2000.
- Program committee member, ACM Supercomputing Conference, 2000.
- Program committee member, ACM International Conference on Supercomputing, 2000.
- Program committee chair, IEEE High-Performance Computer Architecture, 2000.
- Program committee member, ACM/IEEE International Symposium of Computer Architecture, 1999.
- Program committee member, ACM International Conference on Supercomputing, 1999.
- Program committee member, ACM SIGOS/USENIX Symposium on Operating Systems Design and Implementation, 1999.
- Program committee member, ACM Symposium on Principles of Distributed Computing, 1998.
- Program committee member, ACM Symposium on Parallel Algorithms and Architectures, 1998.
- Program committee Vice-Chair, International Conference on Parallel Processing, 1998.
- Program committee member, ACM SIGOS Symposium on Principles of Operating Systems, 1997.
- Program committee member, ACM Supercomputing conference, 1997.

- Program committee member, IEEE Hot Interconnects V, 1997.
- Program committee member, ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems, 1997.
- Program committee Vice-Chair, IEEE Symposium on Parallel and Distributed Processing. 1997.
- Program committee member, IEEE International Conference on Massively Parallel Processing using Optical Interconnections. 1996.
- Program committee Co-Chair, IEEE Hot Interconnects IV, 1996.
- Program committee member, IEEE Symposium on Parallel and Distributed Processing. 1996.
- Program committee member, IEEE Symposium on High Performance Computer Architecture, 1996.
- Program committee member, IEEE Hot Interconnects III, 1995.
- Program committee member, ACM Symposium on Parallel Algorithms and Architectures, 1995.
- Program committee member, ACM SIGOS Workshop on Hot Topics of Operating Systems, 1995.
- Program committee member, International Conference of Parallel Processing, 1995.
- Program committee member, IEEE International Parallel Processing Symposium, 1994.
- Program committee member, ACM Symposium on Principles of Distributed Computing, 1993.
- Program committee member, ACM/IEEE International Symposium on Computer Architecture, 1993.
- Program committee member, IEEE International Conference on Distributed Computing Systems, 1993.
- Program committee member, ACM SIGOS Symposium on Principles of Operating Systems, 1993.
- Program committee member, ACM/IEEE International Symposium on Computer Architecture, 1992.

Conference Program Chairs

Zhijie Jerry Shi

Department of Computer Science and Engineering
University of Connecticut
Storrs, CT 06269
Email: zshi@engr.uconn.edu

BIOGRAPHY

Zhijie J. Shi is an assistant professor of Computer Science and Engineering at the University of Connecticut. He is the director of the Security and Architecture Laboratory at the University of Connecticut (SALUC). His current research interests are in the areas of computer architecture and computer security. He is interested in the security of computer systems including embedded systems and general-purpose processors. Specifically, he has been investigating the essential hardware that not only accelerates cryptographic algorithms but also provides efficient mechanisms for upper system layers such as operating systems and applications to achieve security goals. He is also interested in the design and application of new cryptographic algorithms that utilize novel operations to achieve the same level of security as existing ciphers but have higher performance and lower power consumption. In addition, he has been working on several projects in computer architecture, such as high-performance and low-power processor for multimedia information processing and sensor node and system designs for underwater wireless sensor networks. He is a member of Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineering (IEEE). He received his Ph.D. degree in Electrical Engineering from Princeton University in 2004 and the M.S. and B.S. degrees in Computer Science from Tsinghua University, Beijing, China, in 1996 and 1992, respectively.

Conference Program Chairs

Li-San Wang

Assistant Professor of Pathology and Laboratory Medicine
Institute on Aging / Penn Center for Bioinformatics
University of Pennsylvania
Email: lswang@mail.med.upenn.edu

BIOGRAPHY

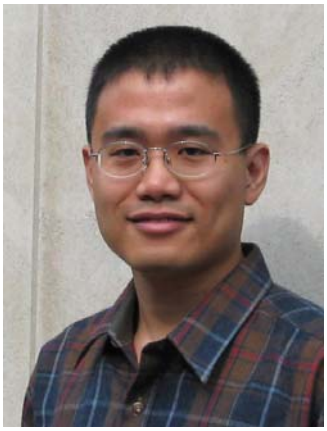
Li-San Wang received his B.S. (1994) and M.S. (1996) in Electrical Engineering from the National Taiwan University. He received his M.S. (2000) and Ph.D. (2003) from the University of Texas at Austin, both in Computer Sciences, and was a postdoctoral fellow at the University of Pennsylvania between 2003 and 2006. Currently he is an Assistant Professor of Pathology and Laboratory Medicine and a fellow of the Institute on Aging, University of Pennsylvania. Dr. Wang's research interests include phylogenetics, comparative genomics, and microarray analysis. He has authored twenty six peer-reviewed book chapters and journals on computational biology and bioinformatics, and served on the program and organizing committees of several international workshops and conferences.

Conference Program Chairs

Yibin Kang

Assistant Professor, Department of Molecular Biology
Princeton University
Princeton, NJ 08544
Tel: 669-258-8834, Fax:609-258-2340
Email: ykang@princeton.edu

BIOGRAPHY



Dr. Kang is a native of Fujian Province in Southern China. He was selected to an experimental science class in Beijing University High School at the age of 15 after wining the National Chemistry Competition in 1988. He received his bachelor's degree from the Department of Genetics at Fudan University in Shanghai in 1995. As a graduate student at Duke University, Dr. Kang studied the mechanism of retroviral gene regulation and cellular mRNA export with renowned virologist Bryan Cullen. After completing his graduate study at Duke in just four years and with 11 publications, Dr. Kang joined the Memorial Sloan-Kettering Cancer Center as a postdoctoral fellow with Dr. Joan Massagué in 2000. He conducted ground-breaking research on TGFβ signal transduction and functional genomic analysis of breast cancer tissue-specific metastasis. During Dr. Kang's pre- and post-doctoral research career, he published over 20 original articles in leading journals such as *Cell*, *Molecular Cell*, *Cancer Cell* and *Genes & Development*.

Dr. Kang joined the faculty of Princeton University as an Assistant Professor of Molecular Biology in the fall of 2004. Dr. Kang's research focuses on the molecular mechanisms of breast cancer metastasis, which is responsible for the large majority of cancer deaths. Dr. Kang's laboratory applies a multidisciplinary approach to analyze the molecular basis of cancer metastasis, combining molecular biology and genomics tools with animal models and advanced *in vivo* imaging technologies.

Dr. Kang's exceptional achievements have been recognized by many prestigious awards, including an American Cancer Society Scholar Award. He was one of the five recipients of the 2006 Department of Defense Era of Hope Scholar Award, intended for exceptionally talented, early-career scientists who have demonstrated that they are the best and brightest in their field through exceptional creativity, vision, and productivity.

Conference Program Chairs

Chung-Jen Ho

Chief Software Architect
Quovadx, Inc.
Mountain View, CA 94040
Tel: 650-949-4977, Fax: 650-964-0131
Email: chungjenho@hotmail.com

BIOGRAPHY

Chung-Jen Ho received his B.S. in Computer Science and Information Engineering from National Taiwan University in 1981 and his Ph.D. in Computer Science from New York University in 1989. He is Certified HL7 Specialist. Currently, he is Chief Software Architect of Quovadx Inc., responsible for health information network architecture, company's product road maps, the development of long-range technology plans, recommendations for new technologies, and technology white papers. He has stabilized many multi-million accounts by spearheading the performance improvement of enterprise healthcare applications. Prior to accepting his current position in 2001, he was an executive member of Confer Software Corp, a startup company focused on business process management and medical management. He worked closely with CEO and President to sell the company to his current company. Prior to Confer Software, he worked for Xerox. He re-architected Xerox Star Window System, the predecessor of all of the modern window systems including Macintosh and Microsoft Windows; he received the Most Valuable Player award in this major project in Xerox. He participated html-wg organization, the predecessor of W3C, and proposed a new type of input tag, INPUT TYPE=FILE, which has been included in the current HTML standard and widely used when people uploading files in the Web.

Chung-Jen Ho's current research interests include Nationwide Health Information Network architectural models, HL7 version 2 to version 3 translations, and health information exchange (HIE). He authored and coauthored 7 patents and 4 mathematic

papers. He has innovated an integration appliance for HIE, created a new product line and established business alliances with a couple of multi-billion companies.

Conference Program Chairs

We-Jen Lee

Professor and Director
Energy Systems Research Center
University of Texas at Arlington
Tel: (817) 272-5046; FAX: (817) 272-5042
Email : wlee@uta.edu

BIOGRAPHY

Wei-Jen Lee received the B.S. and M.S. degrees from National Taiwan University, Taipei, Taiwan, R.O.C., and the Ph.D. degree from the University of Texas, Arlington, in 1978, 1980, and 1985, respectively, all in Electrical Engineering.

In 1985, he joined the University of Texas, Arlington, where he is currently a professor of the Electrical Engineering Department and the director of the Energy Systems Research Center. He has been involved in research on power flow, transient and dynamic stability, voltage stability, short circuits, relay coordination, power quality analysis, and deregulation for utility companies. He has published more than thirty five (35) papers with refereed transaction status and more than ninety five (95) papers presented at conferences and symposia. He has provided on-site training courses for power engineers in Panama, China, Taiwan, Korea, Saudi Arabia, Thailand, and Singapore. He has also served as the primary investigator (PI) or Co-PI of over sixty (60) funded research projects totaling over 6.0 million dollars.

Prof. Lee is a Fellow of IEEE and registered Professional Engineering in the State of Texas.

Conference Program Chairs

Chin Pan

Dean, College of Nuclear Science
National Tsing Hua University
Hsinchu, Taiwan, Republic of China
Email: cpan@ess.nthu.edu.tw

BIOGRAPHY

Dr. Chin Pan is a professor of the Department of Engineering and System Science and the Dean of the College of Nuclear Science at the National Tsing Hua University (NTHU). At which, he also serves as the director of the Center for Energy and Environmental Research. Dr. Pan received his BS degree in nuclear engineering from National Tsing Hua University in 1979, MS and Ph.D degrees in nuclear engineering from University of Illinois at Urbana-Champaign (UIUC) in 1983 and 1985, respectively. After receiving his doctoral degree, Dr. Pan served as a visiting research assistant professor at UIUC before joining NTHU as an associate professor in 1986 and was promoted to full professor in 1990. From the August 1992 to August 1993, Dr. Pan conducted research and served as a Visiting Professor of the Department of Nuclear Engineering at UIUC with a fellowship from the National Science Council of Taiwan, ROC. In the summer of 1998, he conducted microchannel boiling studies in the Department of Engineering Science at the University of Oxford as an academic visitor with a visiting fellowship from Engineering and Physical Sciences Research Council, UK. In the next summer, he conducted researches on multidimensional modeling of two-phase flow in the Rensselaer Polytechnic Institutes as a visiting scholar with a fellowship from the National Science Council of Taiwan, ROC. He served as the Chairman of the Department of Engineering and System Science at NTHU from February, 2001 to January, 2004.

Dr. Pan's research activities for the past twenty years have been in the areas of two-phase flow, boiling heat transfer and energy engineering with a special focus on transition boiling, nucleate boiling near CHF, nuclear reactor thermalhydaulics, two-phase flow instability with or without nuclear coupling, two-phase natural circulation loops, microchannel two-phase flow, microchannel boiling, microchannel heat sink, microchannel reactor, and thermal-fluid transport in fuel cell systems, especially micro direct methanol fuel cells. He published a book in Chinese entitled "Boiling Heat

Transfer and Two-phase Flow" in 2001. He authored and co-authored more than fifty SCI journal papers and more than 60 conference papers. He received an outstanding research award in 1998 and three excellent research awards earlier from the National Science Council of Taiwan, ROC. He also received an outstanding industry – academy collaboration award from the Ministry of Education of Taiwan, ROC in 2003. He served as the chairman of the academic committee for joint projects of Atomic Energy Council and National Science Council from 2001 to 2005.

Conference Program Chairs

Ren-Raw Chen

Associate Professor
Rutgers Business School – Newark & New Brunswick
Rutgers University
New Brunswick, NJ 08903
(732) 445-4236 (W) (732) 445-2333 (F)
rchen@rci.rutgers.edu
http://www.rci.rutgers.edu/~rchen

BIOGRAPHY

Professor Chen's interests include pricing and hedging derivative contracts within the stochastic interest rate environment, pricing and hedging mortgage backed securities, risk management, and analysis of financial markets. He has published in Review of Financial Studies, Journal of Financial and Quantitative Analysis, Journal of Futures Markets, Journal of Fixed Income, Journal of Derivatives, and others.

Professor Chen's expertise includes Financial Markets, Risk Management, Securities Analysis.

Conference Program Chairs

Shin-Yi Chou

Associate Professor, Department of Economics
Lehigh University
syc2@lehigh.edu

BIOGRAPHY

Shin-Yi Chou received her B.A. from National Taiwan University in 1994 and her Ph.D. from Duke University in 1999. She is currently an Associate Professor of Economics and Frank L. Magee Fellow at Lehigh University, and a Research Associate at the National Bureau of Economic Research. Her research focuses on three aspects: quality and cost of health care, economic analysis of obesity, and how health insurance and education affect behavior/health outcomes. Her recent research on parental education and child well-being and national health insurance and child health are funded by National Institute on Child Health and Human Development and National Science Foundation, respectively. Portions of her work have been published in *Journal of Health Economics, Rand Journal of Economics, Review of Economics and Statistics, Health Economics, Journal of Public Economics* and *Journal of Applied Econometrics*.

EITC Board President

Da Hsuan Feng

Special Assistant to the President for Global Strategies and International Relations
Former Vice President for Research and Economic Development and
Professor of Physics
The University of Texas at Dallas
fengd@utdallas.edu

BIOGRAPHY

Da Hsuan Feng received his Physics Ph.D. from University of Minnesota and became M. Russell Wehr Distinguished Chair Professor of Physics at Drexel University. He also held the position of Vice President of Science Applications International Corporation, a Fortune 500 company. In 1996, "for (his) outstanding contributions to the understanding of nuclear structure physics, particularly for the applications of the coherent states to physics and nuclear physics," Feng received the accolade Fellow of the American Physical Society. He is the honorary professor of eleven Chinese universities which included Peking Union Medical College. Feng consulted for three National Laboratories, Los Alamos, Oak Ridge and Brookhaven and UK's Daresbury Laboratory and was the special advisor Korean American Science and Technology Network. He serves on numerous corporate Boards.

EITC Advisory Board Chair

Yu-Hen Hu (胡玉衡)

Professor, Electrical & Computer Engineering
3625 Engineering Hall
1415 Engineering Drive

Madison, WI 53706-1691 Tel: 608/262-6724
Fax: 608/262-1267
E-mail: hu@engr.wisc.edu

BIOGRAPHY

Yu Hen Hu received BSEE from National Taiwan University in 1976. He received MSEE and PhD degrees from University of Southern California in 1980, and 1982 respectively. From 1983 to 1987, he was an assistant professor at the Electrical Engineering Department of Southern Methodist University, Dallas, Texas. Since 1987, he has been with the Department
of Electrical and Computer Engineering, University of Wisconsin, Madison where he is currently a professor.

Dr. Hu has broad research interests ranging from design and implementation of signal processing algorithms, computer aided design and physical design of VLSI, pattern classification and machine learning algorithms, and image and signal processing in general. He has published more than 200 technical papers, edited several books in these areas.

He has served as an associate editor for the IEEE Transaction of Acoustic, Speech, and Signal Processing, IEEE signal processing letters, European Journal of Applied signal Processing, IEEE Multimedia Magazine, and Journal of VLSI Signal Processing. He has served as the secretary
and an executive committee member of the IEEE signal processing society, a board of governors of IEEE neural network council representing the signal processing society, the chair of signal processing society neural network for signal processing technical committee, and is the current

chair of IEEE signal processing society multimedia signal processing technical committee (2004-2005). He is also a steering committee member of the international conference of Multimedia and Expo, IEEE Transactions on Multimedia on behalf of IEEE Signal processing society.

Dr. Hu is a fellow of IEEE.

胡玉衡畢業於國立台灣大學電機系。1982 年獲得洛杉磯南加州大學電機博士學位後，即赴德州達拉斯南美以美大學(Southern Methodist University)任教職。自 1987 年起在威斯康辛大學麥迪生校區(University of Wisconsin – Madison)任教。現任電機及計算機工程系教授。

胡教授研究的領域很廣。包括多媒體信號處理，類神經網路，系統晶片設計方法和高速平行運算法則，以及設計奈米微處理器結構所用的電腦輔助工具。在這些領域裡，他發表了２００篇技術論文，並編輯了兩本專題文獻。

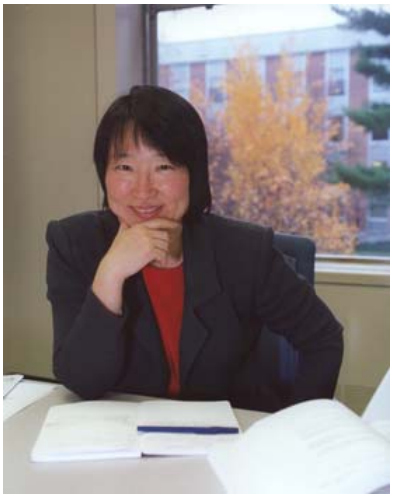
胡教授是電子電機工程學會的會士(Fellow of Institute of Electrical and Electronic Engineers，ＩＥＥＥ)。他曾任ＩＥＥＥ訊號處理協會(Signal Processing Society) 的秘書長，並代表該協會擔任ＩＥＥＥ類神經網路理事會(Neural Network Council)董事，以及擔任過類神經網路訊號處理技術委員會主席。胡教授現任該協會多媒體訊號處理技術委員會主席。他現任ＩＥＥＥ訊號處理雜誌專欄及論壇分項編輯，以及ＩＥＥＥ訊號處理簡訊(Signal Processing Letter)編輯。他曾擔任多項國際會議主席及論文審查主席職務。

EITC Advisory Board Vice Chair

Ruby B. Lee

Professor, Department of Electrical Engineering
B-218, Engineering Quadrangle
Princeton University
Princeton, NJ 08544
609-258-1426 (phone), 609-258-6892 (fax)
email: rblee@princeton.edu

BIOGRAPHY



Ruby B. Lee is the Forrest G. Hamrick Professor of Engineering and Professor of Electrical Engineering at Princeton University, with an affiliated appointment in the Computer Science department. She is the director of the Princeton Architecture Laboratory for Multimedia and Security (PALMS). Her current research is in designing security and new media support into core computer architecture, embedded systems and global networked systems, and in architectures resistant to Distributed Denial of Service attacks and Internet-scale epidemics. She teaches courses in *Cyber Security* and *Processor Architectures for New Paradigms*. She is a Fellow of the Association for Computing Machinery (ACM) and a Fellow of the Institute of Electrical and Electronic Engineers (IEEE). She is Associate Editor-in-Chief of *IEEE Micro* and Editorial Board member of *IEEE Security and Privacy*.

Prior to joining the Princeton faculty in 1998, Dr. Lee served as chief architect at Hewlett-Packard, responsible at different times for processor architecture, multimedia architecture and security architecture for e-commerce and extended enterprises. She was a key architect in the definition and evolution of the PA-RISC architecture used in HP servers and workstations, and also led the first CMOS PA-RISC single-chip microprocessor design. As chief architect for HP's multimedia architecture team, Dr. Lee led an inter-disciplinary team focused on architecture to facilitate pervasive multimedia information processing using general-purpose computers. This resulted in the first desktop computer family with integrated, software-based, high fidelity, real-

time multimedia. Dr. Lee also co-led a multimedia architecture team for IA-64. Concurrent with full-time employment at HP, Dr. Lee also served as Consulting Professor of Electrical Engineering at Stanford University. She has a Ph.D. in Electrical Engineering and a M.S. in Computer Science, both from Stanford University, and an A.B. with distinction from Cornell University, where she was a College Scholar. She is an elected member of Phi Beta Kappa and Alpha Lambda Delta. She has been granted 115 United States and international patents, with several patents pending.

Day 1

After Banquet Speech (Wednesday Evening, August 8, 2007)

In Search of Humanistic Excellence
---Morehouse experience---

Da Hsuan Feng

The University of Texas at Dallas
(Soon-to-be) Senior Executive Vice President
National Cheng Kung University, Tainan, Taiwan

Distinguished guests, Ladies and Gentlemen:

I am humbled by this heavy responsibility and great honor bestowed on me by Michael Wang to say a few words to this august group. In fact, I am a little embarrassed because there are so many people in the audience who could and should be standing where I am standing now. In particular, I like to recognize two individuals. They are Academician **Fujia Yang**, Chancellor of Nottingham University and former President of Fudan University and my life time mentor, and my soon-to-be boss, Academician **Michael Lai**, President of **National Cheng Kung University** (NCKU).

As I was preparing this speech, I cannot help but to recognize that this may be the last talk I will present in public where my by-line is an American institution. Indeed, for the past 35 years, ever since I received my doctorate from the University of Minnesota, I have always had US institutions as by-lines (except for the two years as a postdoc in UK). Using today's US presidential campaign *verbiage*, this is a "change!"

So, what should I talk about that will have some interest to you, and me? To seek guidance, I plowed through many speeches of notable individuals. The two that impacted me most were by President Richard Levin of **Yale University** who recently gave, in my opinion, a definitive speech in Hong Kong's Asia society entitled "Confronting China's Challenges," and President Shih Choon Fong of the **National University of Singapore** who delivered the 2006 State of the University Address entitled "A Good University Teachers, A Great University Transforms."

Ladies and gentlemen, when I knew that I would be taking on the heavy responsibility as the Senior Executive Vice President position of NCKU, I read carefully Academician Lai's Presidential inauguration speech. It was indeed an inspiring speech. He outlined his vision for the university, eloquently and succinctly. Yet, of the many words and phrases he uttered, of the many ideas he proposed, one word stood out, and it was "humanistic."

Quite by serendipity, around the same time while I was reading Lai's speech, Chancellor Fujia Yang was kind enough to send me a speech he will be delivering in the Annual Conference of Chinese Science and Technology Association on September 8 this year. In his usual eloquence, he too talked about many educational issues of fundamental importance. Yet, the central theme is also about "humanistic" education, namely as educators, especially as higher education administrators, we must aim to

produce citizens of the 21st century with a healthy if not strong dosage of humanistic characteristics.

It is therefore very interesting that while President Levin and President Shih did not specifically talk about "humanistic education," in fact if you read carefully in between the lines, that too seems to be their underlying theme.

It is remarkable that all four higher education leaders seem to come to the same conclusion. In the 21st century, with the world the way it is, with so many dark and menacing challenges confronting mankind, some of them if not mitigated soon, may or could cause the demise of humanity; the world must have more citizens who possess humanistic outlook, who can emerge from universities with a sense of responsibility on their shoulders and with fearless can-do attitude to confront and solve global problems.

When a friend of mine from Morehouse College of Atlanta heard that I will soon be going to Taiwan, he was kind enough to send me a warm congratulatory note. Little did he know that his note opened up a "Pandora box" for me! It sparked me to learn more about his university, from which I came to the realization that in fact, Morehouse's sole educational aim is to produce citizens with strength, courage and characters which I have outlined above.

The first thing about Morehouse which hit me "in between my eyes" was its alumni. As someone once told me, "alumni are the souls of an institution." If that were the case, Morehouse is indeed endowed with tremendous souls! Just think that among the many highly successful alumni of Morehouse, you have nationally and internationally notable individuals such as

- **Martin Luther King Jr**, a Nobel laureate and civil rights leader, who is unquestionably the soul of this nation,
- **Julian Bond**, chairman of NAACP also a great civil rights leader,
- Samuel Jackson, a great actor of all times,
- **Maynard Jackson**, the first African American Mayor of Atlanta, Georgia,
- **David Satcher**, Surgeon General of the United States,
- **Spike Lee**, an academy nominated film director and producer,
- **Walter E. Massey**, an outstanding theoretical physicist, Director of the National Science Foundation under President George H. W. Bush, former provost of the University of California System and most recently President of Morehouse,
- **Edwin Moses**, an Olympic gold medalist, sports administrator, and innovative reformer in the areas of Olympic eligibility and drug testing,
- **Louis W. Sullivan**, former U.S. Secretary of Health and Human Services,
- **Nathaniel Bronner**, Founder of Bronner Bros, a cosmetics empire.

Ladies and gentlemen, these are but a small sample of the great alumni of Morehouse College. These individuals are not great, they are giants! Everyone had done and continues to do something that enhances quality of life of people on earth, and uphold the dignity of humanity. So, with this as background, I made an extra effort to learn more about Morehouse College.

I must admit that what I learned about Morehouse truly dumbfounded me. I found out

a. how "small" it is, it has only 3,000 students;
b. how "poor" it is, it has an endowment around $50 million; and
c. how "low" its entering class' average SAT score is, which is around 1070 (1600 maximum).

Compare this with another "well known" liberal arts college, such as Swarthmore College, which is just around the corner from Princeton, the difference cannot be more startling.

Swarthmore is even smaller then Morehouse College, with only about 1,500 students. Yet, Swarthmore has an endowment well over a billion dollars and its incoming class SAT average is around 1400. Swarthmore is known around the country to be a superb institution.

So, if you compare Morehouse with Swarthmore, you would think that Morehouse College cannot possibly produce leaders for the United States, for sure it is not supposed to produce our national soul, such as Martin Luther King jr., it is not supposed to produce some of the greatest artists, some of the greatest scientists, and some of the greatest entrepreneurs and so on!

Yet, Morehouse is incredibly successful in producing true leaders. All of these leaders have something in common, and that is what they did, or are achieving, will enhance the quality of life and dignity of human race. Indeed, few Colleges in the United States, or anywhere else on earth for that matter, can claim to have alumni to have so profound and deep impact on our globe in the 20th and 21st centuries.

Hence, what renders Morehouse so successful? This question truly intrigues me.

Quite remarkably, founded 140 years ago with a mission to teach free-slaves to read and write and be productive citizens in the society, Morehouse College had to battle against segregation and human indignity. Yet, despite all this, it has evolved and emerged to become the personification of searching for humanistic excellence in education.

The answer was succinctly given by Otis Moss III, a second-generation Morehouse Man. According to Morehouses' Wikipedia webpage, Moss has been accepted by Harvard and Yale divinity schools, and "was attracted to Morehouse by the mystique."

"*What impressed me*," Moss says, "*was that brothers who went to Morehouse went through a molding, a transformation process. I won't say they were indoctrinated, but they were presented with the ideals of social responsibility, integrity and honesty. There was a spirituality that emanated from the school and its graduates that was not found anywhere else.*"

Yes indeed, what Moss said about Morehouse, making sure that students emerge from Morehouse possess "*social responsibility, integrity and honesty*," are in fact the essence of humanistic excellence. Morehouse is not slowed by low endowment and not slowed by relatively low SATs from its incoming class. It immerses its students in a thick atmosphere of self-confidence and creativity, while ensuring them to think of themselves as integral parts of the human race.

I think the best summary I can find about Morehouse came from President Leroy Keith, who presided over Morehouse some fifteen years ago. Keith said that "*through a series of evolutionary and intellectual adjustments, (Morehouse) has become more than what we started out to be. And although we are not perfect, we are striving, continuously striving, for that level of perfection that everybody wants as a goal--and we think we are better at what we do than anyone else.*

And when you can say that, I think you have just about said it all."

Ladies and gentlemen, the more I learn about Morehouse College, the more I am convinced of the importance of "humanistic excellence!" In Morehouse, I found the excellence.

In the 21st century, humanity needs more Morehouse College.

As I embarked on my new journey in Taiwan, I am excited by the fact that everyone I have encountered, here and in National Cheng Kung University, are interested in promoting this aspect of education with all their might. I hope you will give me all your helping hand so that together we may be able to render NCKU as an example of a lighthouse in this world in the 21st century. The world needs more illumination, not less.

Thank you so much for your attention.

After Banquet Speech (Thursday Evening, August 9, 2007)

Bridging Worlds through Science

Ruby B. Lee

Forrest G. Hamrick Professor of Engineering and Professor of Electrical Engineering
and Director, Princeton Architecture Lab for Multimedia and Security
Princeton University

P1 - Plenary Session 1

Research at National Cheng Kung University

Yonhua Tzeng

Vice President, Office of Research and Development
National Cheng-Kung University
Tainan, Taiwan, R.O.C.
tzengyo@auburn.edu

ABSTRACT

NCKU is a 75-year-old comprehensive research university in Taiwan consisting of nine colleges including a well developed College of Medicine within a walking distance from Colleges of Engineering, EECS, Sciences, etc. Multidisciplinary education and research is a norm.

With 1,186 faculty members, about 300 postdoctoral research fellows, 21,710 students (graduate to undergraduate ratio is about 1:1), the university produces more than 250 high quality papers per year that are published in top 5% referred journals in various disciplines and produces hundreds of students per year who are the most favorable employees of industries in Taiwan.

In 2006, NCKU received an annual special fund of NTD1.7B (about $50M) for the advancement towards becoming one of the top one hundred universities in the world. This money is being wisely invested in research, teaching, and extension services. Three research clusters, including advanced industrial technology, health-care science and technology, and environmental and renewable technology, are the main themes being supported by this special program.

Located in the ancient capital of Taiwan, NCKU also enjoys neighboring a rapidly developing science based industrial park with numerous world-class high-tech companies. Southern branches of national laboratories such as Chip Implementation Center, Nano Device Laboratory, and National Center for Theoretical Physics, etc. are being established on the campus of NCKU one after the other as part of the integrated and powerful research resources.

NCKU pursues global collaboration on subjects significant to basic sciences and human society. The Institute of Innovations and Advanced Studies at NCKU initiates, facilitates, and accelerates effective and productive global collaborative research projects. These projects are being conducted either on campus or in the laboratories of international collaborators. Through innovations and advanced studies, NCKU is continuously pursuing the excellence and marching towards becoming one of the best universities in the world.

BIOGRAPHY

Personal Information

Yonhua Tzeng, Ph.D.
B.S. in Electrical Engineering, 1977, National Taiwan University
M.S. & Ph.D. in Electrical Engineering, 1981 & 1983, Texas Tech University, Lubbock, Texas
Telephone Number: 886-6-2757575 ext. 31381 (Taiwan), 1-334-844-1869 (US)
E-mail: tzengyo@auburn.edu, tzengyo@gmail.com, tzengyo@ee.ncku.edu.tw

Professional Positions

July 1, 2007 – present: University Chair Professor of Electrical Engineering and Vice President for Research and Development, National Cheng Kung University and Professor Emeritus of Auburn University, Auburn, Alabama, USA

June 9, 2005 - August 15 2006: Director, Institute of Nanotechnology and Microsystems Engineering and Director, Center for Micro/Nano Science and Technology, National Cheng Kung University, Tainan, Taiwan.

September 1, 1983 - present: Emeritus Professor/Alumni Professor/Professor/Associate Professor/Assistant Professor
Alabama Microelectronics Science and Technology Center
Department of Electrical and Computer Engineering
Auburn University, Auburn, Alabama 36849 USA

Professional Society Activities

2005-present Fellow, IEEE
2005-present Vice President, Technical Activities, IEEE Nanotechnology Council
1992-present Associate Editor, New Diamond and Frontier Carbon Technology, Tokyo, Japan.
2004-present Chair, Technical Committee on Nanotechnology, IEEE Industrial Electronics Society.
2006-present Executive Committee Member, New Diamond and Nano Carbon Conference

T1 – Technical Session 1: Nanotechnology (I)

Taiwan's Nanotechnology K-12 Educational Promotion – How We Teach Nanotechnology to Kindergarten-12th Grade Young Kids in Taiwan

Horn-Jiunn Sheen

Professor, Institute of Applied Mechanics National Taiwan University Taipei 107, TAIWAN, R.O.C. Tel: +886-2-3366-5632, Fax: +886-2-3366-5633 Email: sheenh@ntu.edu.tw

ABSTRACT

During the past five years, there has been a special nanotechnology K-12 education program which was specifically for the students with school ages from kindergarten to 12th grade. In Taiwan there are five regional centers for this K-12 educational grogram with university professors as the program directors and joined instructors. Each regional center has its own union K-12 schools and many seed teachers. The professors in each regional center taught the seed teachers basic nanotechnology knowledge. Thereafter the seed teachers were asked to develop teaching materials for the K-12 students. This program has been proved to be one of the most successful projects among all supported by Ministry of Education, Taiwan. In June 2007, there was a 2007 Asia Nano Forum (ANF) Teachers' Workshop in Taipei which was organized especially for K-12 teachers to share their experience in teaching nanotechnology. In this Workshop, the ANF delegates and teachers were also invited to share the progress and experiences in their nanotechnology human resource development programs from 13 economies in the Asia Pacific region including Australia, China, Hong Kong, India, Indonesia, Korea, Japan, Malaysia, New Zealand, Singapore, Taiwan, Thailand and Vietnam. During this Workshop, there were 18 Taiwan K-12 teachers presenting their teaching experiences in the topics as follows, teacher's training and development, teaching material development, e-learning materials and games, summer camps and classes, curriculum integration and lesson design, promotion activities and hands-on experiments. Some teaching experiences will be presented to show the progress of this Taiwan K-12 nanotechnology education grogram.

BIOGRAPHY

Dr, Horn-Jiunn Sheen is currently a professor in the Institute of Applied Mechanics, National Taiwan University, Taiwan. Since September 2006, he is also the director of the Nano-Electro-Mechanical-Systems (NEMS) Research Center, National Taiwan University, Taiwan. From August 2004 to December 2006, he was the director of the North Regional Center of K-12 Nanotechnology Human Resource Development (NHRD) program, Taiwan. Since January 2007, he has been the director of the North Regional Center of Advanced Nanotechnology Education, NHRD program. His research interests include micro-fluidics, biosensors, and micro-channel flow measurements. The main research equipments and facilities in his laboratory are micro particle image velocimetry, flow visualization systems, laser-Doppler velocimetry, and a clean room.

T1 - Technical Session 1: Nanotechnology (I)

Fabrication of PLGA Microvessel Scaffold Made Up of Circular Microchannels with Inner Nano Patterns

Gou-Jen Wang

Professor, Mechanical Department & biomedical Engineering National Chung-Hsing University Taichung 40227, Taiwan Tel: +886-4-22840725 x 320, Fax: +886-4-22877170 Email: gjwang@dragon.nchu.edu.tw

ABSTRACT

PLGA (poly(lactic-*co*-glycolic acid)) has been successful as a biodegradable polymer for tissue engineering because it can undergo hydrolysis in the body to produce the original monomers, lactic acid and glycolic acid, resultantly producing very minimal systemic toxicity. In this research, a simple micromolding method to fabricate PLGA microstructures made up of circular microchannels with inner nano patterns is presented. The thermal reflow technique was adopted to fabricate the semi-cylindrical photoresist master. Following, nano structures were patterned on the surfaces of the semi-cylindrical photoresist master by anodic oxidation. The PLGA solution was prepared by dissolving PLGA polymer in acetone and then casting the solution onto the nano porous semi-cylindrical photoresist master to produce the concave PLGA microstructures with inner nano patterns. Two concave PLGA membranes were bonded together to form the circular microchannels consisted microstructures. A microvessel scaffold for tissue engineering by implementing the proposed method was fabricated. The bovine endothelial cells (BEC) were cultured into the scaffold by semi-dynamic seeding. The cellstain calcein-AM was applied to overcome the opaque problem of PLGA scaffolds and effectively monitor the cell seeding progress.

BIOGRAPHY

Dr. Wang received the B. S. degree on 1981 from National Taiwan University and the M. S. and Ph. D. degrees on 1986 and 1991 from the University of California, Los Angeles, all in Mechanical Engineering. Following graduation, he joined the Dowty Aerospace

Los Angeles as a system engineer from 1991 to 1992. Dr. Wang joined the Mechanical Engineering Department at the National Chung-Hsing University, Taiwan on 1992 as an Associate Professor and has become a Professor on 1999. From 2003-2006, he served as the Division Director of Curriculum of the Center of Nanoscience and Nanotechnology. Since 2007, he has been the joint Professor of the Institute of Biomedical Engineering. His research interests are MEMS, Biomedical Micro/Nano devices, Nano fabrication.

SELECTED RESEARCH PROJECTS:

- Microvessel Scaffold for Tissue Engineering: The fabrication techniques of different microvessel scaffold and related cell seeding issues are thoroughly investigated. The scaffold materials include PDMS, PLGA, and PLA.
- Anodic Aluminum Oxide (AAO): The fabrication techniques and applications of AAO are considered. A simpler and low cost method to fabricate porous pattern of the anodic aluminum oxide (AAO) based on the aluminum foils laminate approach were developed. Applications include as templates to fabricate nano patterned biomaterials, high aspect ratio (up to 200) metallic nano needle array, and ITO nano patterned electrodes for DSSC.
- Chloroplastmimic Photovoltaics: A simple chloroplastmimic photovoltaic, in which water is photolyzed by a new photocatalyst fabricated by depositing a thin film of TiO2 on an array of carbon nanotubes (CNT), has been developed. Hydrogen ions with various concentrations are separated by an artificial thylakoid membrane, resulting in a transmembrane chemiosmotic potential, generating ion-diffusion-induced electricity.

T1 - Technical Session 1: Nanotechnology (I)

Applications of Nanoindentation Technology to Study the Mechanical Properties and Fatigue Behavior of Hard Thin Films

Jen-Fin Lin

Chair Professor, Department of Mechanical Engineering
National Cheng Kung University
Tainan City 701, Taiwan ROC
Email: mailto:jflin@mail.ncku.edu.tw
jflin@mail.mina.ncku.edu.tw

ABSTRACT

In this study, a theoretical model is proposed to evaluate the resistance in fatigue fracture in terms of the energy W_J absorbed by the coating film of a substrate during the process of occurring fractures. Because of some similarities in the contact force mechanisms, the Paris law which was developed to evaluate the crack-length propagation rate of a lump material in fatigue tests is lightly modified first and then applied to evaluate the same parameter arising at a coating film through the nanoindentation tests. The energy required for a coating film to occur fatigue fracture is obtained to be equal to the difference between the plastic work obtained in the nearly-constant load region of occurring the fatigue fracture and the plastic work obtained in the same load region but assuming no fatigue fracture. The oscillating load cycles in this specific region is determined by the use of this modified Paris law, they are needed in the evaluation of the plastic work associated with the situation of no fatigue fracture. The fatigue tests were arranged by changing the operating conditions in the oscillating load region including the mean *load* P_{mean}, *the load* amplitude P_o and the load frequency *f*. The experimental results indicate that only the load frequency is of importance to the energy W_J;
the indentation-depth propagation rate is lowered by increasing the oscillating load frequency. The energy W_J evaluated at high load frequencies is elevated by increasing the load frequency; however, it is almost a constant value as the load frequency is sufficiently small.

BIOGRAPHY

Dr. Lin received his Ph. D in Department of Mechanical Engineering from Columbia University. Tribology including wear, friction and lubrication was Prof. Lin's major field in the research during the period of 1985 to 1993. In this period, Prof. Lin had carried out the studies as to the subjects of the tribological tests for the friction and wear resistance performances of several ceramic films coating of different substrate materials.

Achievement contains the repays of the experimental results to the specimen supplier to promote the coating technique and process. After 1998, Prof. Lin devoted his efforts in the analyses of high-speed ball bearings and ball screws. A breakthrough was achieved in these studies due to the new methods which were developed in an innovative way to replace the traditional analyses developed in an extremely complex way. This achievement allows the data to be available for the designs of high-speed ball bearing and ball screws which are commonly applied in a high-precision working machines. In a period of 1994 to 1999, Prof. Lin's group put endeavors in the development of the tribological model for the chemical mechanical planarization. This theoretical model was established considering over 20 influential factors, and it was vilified to be trustworthy for the silicon wafers with different coating films. This model can predict these CMP fabrication parameters with their precision genuinely in the nano-scale. Fractal model in these recent years has been developed very successfully to apply in the study of micro/nano contact problems of two contact surfaces. The micro/nano contact mechanics is very important in the study of the interaction force (for example, adhesion force) formed at the interface of two contact bodies with surface roughness. A great breakthrough has been achieved in the predictions of the contact parameters such that this method becomes much more efficient than the conventional statistics in the predictions of the dynamic variations of these contact parameters arising at different contact interferences. In one of Prof. Lin's current studies, his group has been trying to extend the present achievement to incorporate with the molecular dynamic in order to develop the multi-scale mechanics. The multi-scale mechanics is very important for the micro/nano technologies arising in the meso-scale. The quantum theory developed in the nano-scale can be transformed to the engineering applications (in the micro-scale) through the use of this multi-scale mechanics. In these few years, the theoretical models have also been developing successfully for the nanoindentaitons of hard and soft materials. These innovation-enriched models allow us to evaluate the "dynamic" performances demonstrated in these materials due to their viscoelastic behavior. These properties allows us to develop the contact forces arising at the interface of an indenter and specimen, which are important as to the investigation of micro/nano defects formed in the nanoindentaion. Dr. Lin has published more than 120 international journal papers and has been a reviewer of several technical journals. He is a member of the following professional societies: ASME and STLE in USA.

T1 - Technical Session 1: Nanotechnology (I)

ZnO Nanowire-based Gas Sensors

Shoou-Jinn Chang

Associate Director, Center for Micro/Nano Science and Technology Professor, Department of Electrical Engineering National Cheng Kung University Email: changsj@mail.ncku.edu.tw

ABSTRACT

This investigation discusses the growth of high-density single crystalline ZnO nanowires on patterned ZnO:Ga/SiO2/Si templates and the fabrication of ZnO nanowire-based CO gas sensors. The ZnO nanowires grown on a sputtered ZnO:Ga layer were vertically aligned while those grown directly on a SiO2 layer were randomly oriented. Additionally, the average length of the nanowires increased and the average diameter of the nanowires decreased as the amount of zinc metal powder in the quartz tube was increased from 0.1 to
0.25 g. As the amount of zinc metal power increased to 0.3 g, the nanowires became markedly shorter. Measuring the resistivity change of the samples at 320oC indicated that the sensor responses (((Ra − Rb)/Ra) × 100%), Ra is the resistivity in air and Rb in CO gas) of the ZnO nanowire CO sensors prepared with 0.1, 0.15, 0.2, 0.25 and 0.3 g zinc metal powder were 5%, 8%, 35%, 57% and 29% , respectively.

BIOGRAPHY

S. J. Chang was born in Taipei, Taiwan on January 17, 1961. He received his BSEE degree from National Cheng Kung University (NCKU), Tainan, Taiwan in 1983, MSEE degree from State University of New York, Stony Brook in 1985 and Ph.D.EE from University of California, Los Angeles in 1989. He was a research scientist with NTT Basic Research Laboratories, Musashino, Japan from 1989 to 1992. In 1992, he became an Associate Professor with the EE Dept. NCKU and was promoted to full Professor in 1998. Currently, he also serves as the Deputy Director of the Center for Micro/Nano Science and Technology, NCKU. He was a Royal Society Visiting Scholar with University of Wales, Swansea, UK from January 1999 to March 1999, a Visiting Scholar with Research Center for Advanced Science and Technology, University of Tokyo, Japan from July 1999 to February 2000, a Visiting Scholar with Institute of

Microstructural Science, National Research Council, Canada from August 2001 to September 2001, a Visiting Scholar with Institute of Physics, Stuttgart University, Germany from August 2002 to September 2002, and a Visiting Scholar with Faculty of Engineering, Waseda University, Japan July 2005 to September 2005. He is also an honorary professor of Changchun University of Science and Technology, China. Dr. Chang received outstanding research award from National Science Council, Taiwan in 2004. His current research interests include semiconductor physics, optoelectronic devices, and nanotechnology.

T2 - Technical Session 2: Bioinformatics & Systems Biology (I)

Session Chair

Frank Hsu

Clavius Distinguished Professor of Science
Associate Chair for Graduate Studies
Department of Computer & Information Sciences
340 John Mulcahy Hall
441 East Fordham Road, Bronx NY 10458
Email: hsu(at)cis.fordham.edu
Phone: 718-817-4483

BIOGRAPHY

D. Frank Hsu is the Clavius Professor of Science and Professor of Computer ad Inforamtion Science at Fordham University, New York, NY, USA. He received a Ph.D. from the Univesity of Michigan. He has held visiting scholar or faculty positions at MIT, Boston University, Keio University, JAIST, Taiwan University, Tsing-Hua University(Hsin-Chu, Taiwan), CNRS & the University of Parid-Sud.

Dr. Hsu's research interests are interconnection networks; combinatorics, algorithm and optimizations; informatics and intelligent systems. His recent work on Combinatorial Fusion Analysis(CFA) has applications in arget recognition and tracking, systems biology and bioinformatics, virture screening and drug discovery.

Dr.Hsu has served on PC and organizing committee for several conferences including I-SPAN, IEEE AINA, and DIMACS. He has served on editorial boards including IEEE TC, Networks, International Journal of Foundation of Computer Science,(as Editor in Chief(2000-06) and special issues) of Journal of Interconnection Networks, and Pattern Recognition Letters. He is a senior member of IEEE, a Foundation Fellow of ICA and a Fellow of the New York Academy of Sciences.

T2 - Technical Session 2: Bioinformatics & Systems Biology (I)

Computational Analysis of Transcriptional Regulation

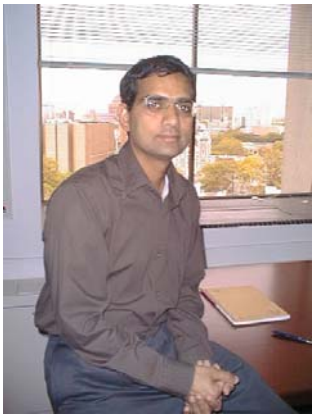
Sridhar Hannenhalli

Assistant Professor, Genetics Department
University of Pennsylvania
Philadelphia, PA 19104
Tel: 215-746-8683, Fax: 215-573-3111
Email: sridharh@pcbi.upenn.edu

ABSTRACT

Biological processes are controlled at various levels in the cell and while these mechanisms are poorly understood, transcriptional control is widely recognized as an important component. We have been focusing on various computational problems pertaining to transcriptional regulation, namely, 1) Computational identification of transcription factor binding sites, 2) PolII promoter prediction, 3) Predicting interaction among transcription factors, 4) Transcriptional modeling, i.e. identifying arrangements of TFs that co-regulate a set of transcripts. We will present an overview of the field and some recent unpublished work pertaining to the evolution of transcriptional regulation.

BIOGRAPHY



Dr. Hannenhalli received his PhD in 1996 in Computer Sc. from the Pennsylvania State University under Dr. Pavel Pevzner. After a postdoctoral fellowship at the University of Southern California, he spent 6 years in the industry as a senior scientist, first at Glaxo Smithkline and then at the Celera Genomics. His earlier work on genome rearrangements led to the Hannenhalli-Pevzner theorem that provides an efficient algorithm to solve the inversion distance problem. His recent focus has been on studying eukaryotic transcriptional regulation, using computational genomics approaches. He joined Department of Genetics in the school of medicine at U. Penn where he is currently an Assistant Professor of Bioinformatics.

T2 - Technical Session 2: Bioinformatics & Systems Biology(I)

Is Less More?
On Statistical Investigation for Large Biological Networks

Henry Horng-Shing Lu

Professor, Institute of Statistics
National Chiao Tung University
Hsinchu, Taiwan 30050, R. O. C.
Tel: 886-3-5731870, Fax: 886-3-5728745
Email: hslu@stat.nctu.edu.tw

ABSTRACT

Is it possible to develop simplified models to gain insights for large and complex biologic networks? This talk will discuss our attempts to develop statistical methods for this purpose that include network reconstruction by Boolean networks (Journal of Computational Biology, 2005), studies of yeast transcription factors (Proceedings of the National Academy of Sciences of the United States of America, 2005, Bioinformatics, 2006) and evolution of the yeast protein interaction network (Proceedings of the National Academy of Sciences of the United States of America, 2003). Future developments regarding this direction will be discussed as well.

BIOGRAPHY

Henry Horng-Shing Lu received his Ph.D. and M.S. degrees in Statistics from Cornell University, NY, USA, in 1994 and 1990, respectively, and his B.S. degree in electric engineering from National Taiwan University, Taiwan, ROC, in 1986. He is a Professor in the Institute of Statistics, National Chiao Tung University, Hsinchu, Taiwan, ROC. He has been a visiting scholar at UCLA, Harvard University and University of Chicago. His research interests include statistics, medical images, and bioinformatics. He and collaborators have around 30 journal papers published or accepted in the topics related to statistics, medical images, and bioinformatics, including Journal of the American Statistical Association, Journal of Multivariate Analysis, Statistica Sinica, Journal of Computational and Graphical Statistics, IEEE Transactions on Reliability/Image Processing/Medical Imaging, Pattern Recognition, Ultrasound in Medicine and Biology,

Trends in Genetics, Proceedings of the National Academy of Sciences of the United States of America, Journal of Computational Biology, Bioinformatics and so forth.

T2 - Technical Session 2: Bioinformatics & Systems Biology(I)

Predicting Protein-Protein Interaction using the Identification of Putative Interaction Sites

Cheng-Yan Kao

Professor, Department of Computer Science and Information Engineering,
National Taiwan University and Institute for Information Industry, Taipei, Taiwan
cykao@csie.ntu.edu.tw

ABSTRACT

Protein-protein interaction and binding site information are important information in understanding biological processes. Experimental approaches for elucidation of protein-protein interactions are far behind the tremendous number of possible interactions. Computational approaches are able to predict protein-protein inter-actions with reasonable accuracies. However, current computational approaches using primary structure information are not able to identify potential interaction sites.

In this paper, we propose an Apriori-like algorithm to mine possibly related binding patterns in interaction and sequence information, and then use these found patterns to predict protein interactions and binding sites. Our predictions are based on patterns identified from the sequences to mine tri-gram positive and negative patterns in different species, including datasets of Helicobacter pylori, human, yeast, and Escherichia coli. We verify the predictive capability of our proposed method, by using 10-fold cross-validation to *H. pylori* and human datasets, with 74% and 66% accuracies, respectively. Further improvement can be made using data fusion techniques and the notion of a rank-score function. Moreover, we applied our methods to 210 pairs of protein complexes with 3D structures. The predicted binding patterns are highlighted in their respective 3D structures with their spatial proximity verified.

This is a joint work with Meng-Jia Tsai and Chen-hsiung Chan; Department of Computer Science and Information Engineering, National Taiwan University, Taipei, 10617, Taiwan and D. Frank Hsu; Department of Computer and Information Science, Fordham University, New York, NY, 10023, USA.

BIOGRAPHY

Dr. Cheng-Yan Kao is a Professor of Computer Science and Information Engineering and Molecular Biology and Biochemistry at National Taiwan University and a vice president of the Institute for Information Industry (III), Taipei, Taiwan. Dr. Kao received his BA degree (1991) from National Taiwan University, MS and Ph.D. degree in Computer Science (1981) from the University of Wisconsin-Madison. Dr. Kao was with NASA Johnson Space Center (Houston, Texas) (1980-90) and joined National Taiwan University in 1990. Dr. Kao's research interests are bioinformatics, genetic algorithms, sensor network and grid computing. Dr. Kao was founding president of Bioinformatics Society of Taiwan and a director and the President of Asia Pacific Bioinformatics Society.

T3 - Technical Session 3: C4I (I)

Session Chair

RHIN Architectural Models and HIE Appliance

Chung-Jen Ho

Chief Software Architect
Quovadx, Inc.
Mountain View, CA 94040
Tel: 650-949-4977, Fax: 650-964-0131
Email: chungjenho@hotmail.com

ABSTRACT

Regional Health Information Organization, or RHIO, connects healthcare providers, laboratories, pharmacies, key individuals and other (e.g. public health) institutions in a region to share health information in a safe, secure fashion. RHIO is a specialization of *Health Information Exchange* (HIE). Since *Office of National Coordinator for Health Information Technology* (ONCHIT) awarded grants to four RHIOs as *Nationwide Health Information Network* (NHIN) prototypes in 2005, more than three hundred RHIO projects have been established in US. We examined the architectures of the four NHIN prototypes and other RHIO projects we have involved, and categorized the architectural models of the RHIOs into five categories: Record Locator Service, Federated Repositories, Centralized Repository, Message Distribution, and Patient Carried. We discussed some of the benefits and challenges of each architecture models, and the relationship of architecture to standards such as *Integrating the Healthcare Enterprise* (IHE) framework. Our analysis suggested hybrid architecture to predominate and informed the concept of integration appliance for *Regional Health Information Network* (RHIN).

BIOGRAPHY

Chung-Jen Ho received his B.S. in Computer Science and Information Engineering from National Taiwan University in 1981 and his Ph.D. in Computer Science from New York University in 1989. He is Certified HL7 Specialist. Currently, he is Chief Software Architect of Quovadx Inc., responsible for health information network architecture, company's product road maps, the development of long-range technology plans, recommendations for new technologies, and technology white papers. He has stabilized many multi-million accounts by spearheading the performance improvement of enterprise healthcare applications. Prior to accepting his current position in 2001, he was an executive member of Confer Software Corp, a startup company focused on business process management and medical management. He worked closely with CEO and President to sell the company to his current company. Prior to Confer Software, he worked for Xerox. He re-architected Xerox Star Window System, the predecessor of all of the modern window systems including Macintosh and Microsoft Windows; he received the Most Valuable Player award in this major project in Xerox. He participated html-wg organization, the predecessor of W3C, and proposed a new type of input tag, INPUT TYPE=FILE, which has been included in the current HTML standard and widely used when people uploading files in the Web.

Chung-Jen Ho's current research interests include Nationwide Health Information Network architectural models, HL7 version 2 to version 3 translations, and health information exchange (HIE). He authored and coauthored 7 patents and 4 mathematic papers. He has innovated an integration appliance for HIE, created a new product line and established business alliances with a couple of multi-billion companies.

T3 - Technical Session 3: C4I (I)

SMART HOSPITAL™: Translating Science into Practices that Save Lives

Carolyn L. Cason

Professor, School of Nursing
University of Texas at Arlington
411 S. Nedderman
Arlington, Texas 76019-0407
Tel: 817-272-5781, Fax: 817-272-7343
Email: clcason@uta.edu

ABSTRACT

The Smart Hospital™ is a 23-bed teaching and research facility with state of the science healthcare information technology, equipment, and furnishings. It includes a 7-bed Emergency Department, a 4-bed Intensive Care Unit, a 2-bed Neo-natal Intensive Care Unit, 2 Labor and Delivery suites, a 3-bed Pediatric unit, a 4-bed Medical-Surgical Unit, and a Resuscitation Room. The Smart Hospital™ is 'patiented' by scripted patients (actors) and high-fidelity interactive manikins that can be programmed to breath, deliver a baby, cry, express pain, experience symptoms, die and be resuscitated. The Smart Hospital™ creates the environment to prepare the next generation of healthcare professionals – those prepared to capitalize on technological advances. In addition to serving as a training/educational laboratory for the School of Nursing and regional healthcare agencies, it serves as the research and development site to support beta testing of new products and emerging technologies, the development and evaluation of best educational practices and processes, evaluation of environmental factors on health and safety, evaluation of care practices, and translational research. It is designed to serve as a model to test emergency preparedness related to bio-terrorism and natural disasters. The Smart Hospital™ will help close the gap between what we know and what we can do. It is to healthcare what flight simulators are to aviation.

BIOGRAPHY

Carolyn L. Cason obtained her diploma in nursing from Breckenridge Hospital, Austin, Texas, in 1965. She earned her B.S.N in Nursing from the University of Texas Medical Branch, Galveston, Texas, in 1967, her M.S.N in Nursing from the University of Texas System School of Nursing in 1972, and a Ph.D. in Educational Psychology from the University of Texas, Austin, in 1972. She held a National Institutes of Health Pre-Doctoral Fellowship during her doctoral studies. Currently she is Professor, Associate Dean for Research and Director of the Center for Nursing Research, School of Nursing, University of Texas at Arlington. She also serves as an Associate in the Center for Hispanic Studies in Nursing and Health where she provides direction for the Center's research agenda. Prior to accepting her current position in 1997, she held academic appointments at the University of Texas at El Paso, Temple University in Philadelphia, and the University of Arkansas for Medical Sciences. She was the founding editor of the first on-line journal in nursing. She is the recipient of numerous awards for her research in nursing.

Carolyn Cason's current research activities include assessing the physiologic demands associated with performing cardiopulmonary resuscitation, beta testing resuscitation education and training products associated with implementation of the most current (2005) American Heart Association Guidelines, evaluating the use of simulation as a pedagogy in competency development, and evaluating educational and workforce factors that influence entry into the healthcare professions among persons from minority backgrounds. Her current research activities are supported by the American Heart Association, Laerdal Medical Corporation, and the Texas Higher Education Coordinating Board. She authored and coauthored over 50 reviewed scientific papers (4 recognized as landmark publications), 1 book review, 1 patent application, 30 newsletters, and 186 conference proceedings.

T3 - Technical Session 3: C4I (I)

Intelligent and Ubiquitous Patient Monitoring by Using Data Mining and Telecare Techniques

Vincent S. Tseng

Associate Professor, Dept. Computer Science and Information Engineering
National Cheng Kung University
Tainan, Taiwan, R.O.C.
&
Director, Dept. Medical Informatics
National Cheng Kung University Hospital
Tainan, Taiwan, R.O.C.

Tel: +886-6-2757575 ext 62536, Fax: +886-6-2747076
Email: tsengsm@mail.ncku.edu.tw

ABSTRACT

Patient monitoring is an important topic in healthcare with the aim to provide continuous care for patients. We developed an intelligent and ubiquitous patient monitoring system for asthma diseases by utilizing data mining and telecare techniques. The main features of this system are: First, the vital signs of patients may be input via wired or mobile networks so that the patient's status can be obtained and stored into databases from anywhere. Second, a prediction model is constructed by using data mining techniques to analyze an integrated database, which include the patient's profile and electronic medical records as well as environmental data that reflects the main indicators of environmental quality. The built prediction model is then embedded in the monitoring system serving for calculating the probability of outbreak for each patient in real-time based on the newly-input vital signs and environmental data. Third, an intelligent software module, which utilizes the prediction model and medical knowledge bases, is deployed in the client side (PC or cellular phone) for providing interactive telecare on the patients. Fourth, the central monitoring system actively and continuously assesses the risk of asthma patients by analyzing the real-time status of patients and the environmental factors. Once a high risk event is foreseen, an alarm module is triggered to inform the patients and doctors automatically through cellular networks. Meanwhile, the doctors can also retrieve the patient's medical records easily from anywhere. In this way, the patients can get ubiquitous telecare in the perspective of preventive medicine.

BIOGRAPHY

Vincent S. Tseng received his Ph.D. degree from National Chiao Tung University, Taiwan, R.O.C., in 1997, majored in computer science. He was invited as postdoctoral research fellow in Computer Science Division of University of California at Berkeley, U.S.A during January 1998 and July 1999. Since August 1999, he has been the faculty at Department of Computer Science and Information Engineering at National Cheng Kung University, Taiwan. Since February 2004, he has also served as the director for Dept. Medical Informatics in National Cheng Kung University Hospital, Taiwan. He is on the editorial board of International Journal of Data Mining and Bioinformatics and the board member of Bioinformatics Society Taiwan. He was the board member of Taiwanese Association for Artificial Intelligence during 2003 and 2007. He also served as the advisory member for Department of Health, Tawian on Taiwan's Hospital Information System specification.

Dr. Tseng has a wide variety of research interests covering data mining, biomedical informatics, Web technology and multimedia databases. He has published more than 100 research papers in referred journals and international conferences. He holds, or has filed, 10 patents in USA and ROC. He is a member of IEEE, ACM and honorary member of Phi Tau Phi Society. Dr. Tseng has also served as program committee/chairs for a number of international conferences related to data mining and biomedical informatics.

T4 – Technical Session 4: Emerging Energy Technology (I)

Environmentally Friendly Integrated Oil Refining Complex

Nai Y. Chen

Research Professor
Center for Renewable Energy, Science & Technology (CREST)
University of Texas at Arlington
Email: naiychen@earthlink.net

ABSTRACT

The success of improving the standard of living worldwide demands increasing the supply of both fossil fuels and alternative energies, such as nuclear, water, wind, solar and biomass, while protecting the fragile environment. It also demands reducing the rate of overall consumption by elevating the energy efficiency of fossil fuel engines, including automobiles, locomotives, ships, airplanes, power plants and machines used in industries and farms.
The oil industry has provided fuels for more than 100 years. It has played an important role in industrialization and the global economy in spite of the harmful effects of its processes and products on the environment. Over the years, the advances in new catalysts and processing technologies have actually slowed the rate of crude oil consumption since 1970. At present, there is no economic incentive for any oil company to change in spite of spending annual remedial expenditures to meet government regulations,

In this paper, a comparison is made between two grass roots refineries. One is based on a typical current processing scheme; while the other takes a proactive approach. This proactive approach eliminates all environmental pollutants during oil refining and produces a slate of high performance fuels that will encourage the engine manufacturers to upgrade their engine efficiency to reduce transportation fuel consumption. A preliminary economic analysis showed that the processing cost of both refineries is comparable but higher than one operating with fully depreciated facilities.

This environmentally friendly fuels refinery could also integrate petroleum processing with the processing of tar sand oil, shale oil, coal, biomass and polymer wastes. Its products could be diversified to synthetic lubricating oils, petrochemicals and the supply of pure hydrogen and the sequestration of CO_2.

BIOGRAPHY

Nai Y. Chen recently joined the University of Texas at Arlington as a Research Professor joint across the Colleges of Engineering and Science, working in the Center for Renewable Energy, Science & Technology (CREST). He has been a technical consultant and energy conservation advocate since he retired in 1994 after almost 34 years as a scientist with Mobil Research and Development Corporation. He received his B.S. degree (1947) in Chemistry from the University of Shanghai, China, his M.S. degree (1954) from Louisiana State University and his Sc.D. degree (1959) from the

Massachusetts Institute of Technology, both in Chemical Engineering. He was elected to the National Academy of Engineering in 1990. He holds more than 126 U.S. patents on novel catalysts, petroleum refining, petrochemicals and biomass processes. He is the principal author or co-author of 11 technical books and 75 papers in technical journals, and he has presented more than 52 technical papers in the U.S., China, Taiwan and Singapore. He is a member of the American Institute of Chemical Engineers and the North American Catalysis Society.

Solar Cell Technologies Beyond Silicon

Meng Tao

Associate Professor
Electrical Engineering Department
University of Texas at Arlington
Email : mtao@uta.edu

ABSTRACT

After a brief introduction of the physics involved in photovoltaics, an overview will be presented on the current status of solar cell technologies. The focus will be on next-generation solar cells. These solar cells need to be twice as efficient as silicon solar cells while 10-times cheaper than silicon solar cells. The development of these solar cells is further complicated by the many requirements set forward by the expectation that these solar cells will go into every household. Our analysis leads to the conclusion that wet-chemically fabricated metal oxide heterovalence multijunction solar cells, which we proposed recently, have the best chance to meet the various requirements for next-generation solar cells. They can be as cheap as organic cells but as efficient as III-V tandem cells. The technical challenges in utilizing metal oxides for next-generation solar cells are presented. Approaches to address these technical challenges will be discussed and preliminary experimental results will be presented. Our most significant results include the demonstration of an electrochemically-deposited p-n homojunction in cuprous oxide and an omni-directional, broad-spectrum and substrate-independent antireflective coating from solution deposition.

BIOGRAPHY

Meng Tao received his PhD in Materials Science and Engineering from the University of Illinois at Urbana-Champaign, MS in Semiconductor Materials from Zhejiang University, and BS in Metallurgy from Southern Institute of Metallurgy. He is currently an associate professor in the Department of Electrical Engineering at the University of Texas at Arlington. His research focuses on semiconductor surfaces, interfaces, and thin films for photovoltaics and nanoelectronics. He has over 100 publications in

scientific journals and conferences and 1 US patent with 6 more pending. His research has been funded by NSF, SRC, SEMATECH, ONR, Petroleum Research Fund, and the State of Texas. He has received several awards and recognitions, including the South Central Bell Professorship in 2001, Outstanding Young Faculty Award in 2004, and Research Excellence Awards in 2005, 2006 and 2007.

T4 - Technical Session 4: Emerging Energy Technology (I)

Wind Generation Capacity Forecasting to Improve the Unit Commitment Scheduling

Wei-Jen Lee

Professor and Director
Energy Systems Research Center
University of Texas at Arlington
Tel: (817) 272-5046; FAX: (817) 272-5042
Email : wlee@uta.edu

ABSTRACT

Wind energy has gained extensive interest and become one of the most mature renewable energy alternatives to the conventional fuel-based resources. The development of wind power generation has rapidly progressed over the last decade. The record shows that wind power generation has expanded with an annual rate of 25 percent since 1990 and demonstrates a great potential in many regions of the US [1]. According to the record from National Renewable Energy Laboratory, Texas becomes the No. 1 in US regarding the installation capacity of wind generation facilities.

Despite various benefits of the wind power, an integration of wind energy into the electric grid is difficult to manage. The main challenge associates with its unpredictability. The power generated from the wind rapidly fluctuates, which imposes difficulties both in terms of operation and planning.

Because of intermittent nature of the wind, the utilities traditionally ignore the capacity of wind resources in their unit commitment (UC) scheduling. However, a saving can be realized from the reduction of thermal plant commitment if part of wind capacity can be counted towards 'firm' energy resource. Besides, neglecting wind capacity totally in generation planning can be harmful for the system with increasing wind generation penetration level.

To efficiently utilize the resources, at least part of the capacity of the wind generation should be taken into account in the UC scheduling. An accurate wind power forecast would allow the utility to harvest the wind capacity and improve the system operation. However, there must be balance between these savings and the potential impact on the system reliability. The dependable capacity of the wind resources depends on the accuracy of the forecasting model. In this regard, the concept of confidence interval comes into play in the wind generation dispatch.

This presentation describes the development of an Artificial Neural Networks (ANN) short-term wind power generation forecast for a wind farm. The wind forecast model with a 10-minute forecasting time step and lead-time up to three days ahead has been developed. A new concept of wind capacity dispatch is proposed.

T5 - Technical Session 5: System-on-Chip (I)

Design Automation for Three-Dimensional Integrated Circuits

Yuan Xie

Assistant Professor
Pennsylvania State University
Computer Science & Engineering Department
354E Information Science Technology Building,
University Park, PA, 16802
Email: yuanxie AT cse dot psu dot edu
Phone: 814-865-7496
FAX: (814)-865-3176

ABSTRACT

Three-dimensional (3D) technologies have been proposed as a promising solution to mitigate interconnect challenges in SOC designs. By stacking multiple active device layers with vertical interconnect, 3D technologies offer designers great opportunities meeting performance and power requirements. As fabrication of 3D architecture becomes feasible, it is urgent to develop 3D tools for designers to explore 3D integrated circuits (3D ICs) design space. This talk will give an introduction on 3D integration technology and discuss challenges involved in design automation for 3D IC design. Finally, several case studies are provided to illustrate the benefits of 3D technologies.

BIOGRAPHY

Professor Yuan Xie is a faculty member in Computer Science and Engineering department at the Pennsylvania State University. He received the B.S. degree in electronic engineering from Tsinghua University, and received the M.S. and Ph.D. degrees in electrical engineering from Princeton University. Before joining Penn State in Fall 2003, he was with IBM Microelectronic Division's Worldwide Design Center. He was a recipient of the SRC Inventor Recognition Award in 2002. and NSF CAREER award in 2006. He also received Best Paper Award in ASICON 2001, Best Paper Award Nomination in ICCAD 2006. He is currently Associate Editor for IEEE Transaction on

VLSI, and has served as a TPC member in many conferences. His research interests include VLSI Design, computer architecture, embedded systems design, and EDA. His current research are sponsored by NSF, DARPA, IBM, Honda, and Toyota.

T5 – Technical Session 5: System-on-Chip (I)

Secure Key Management Architecture for Sensor Networks

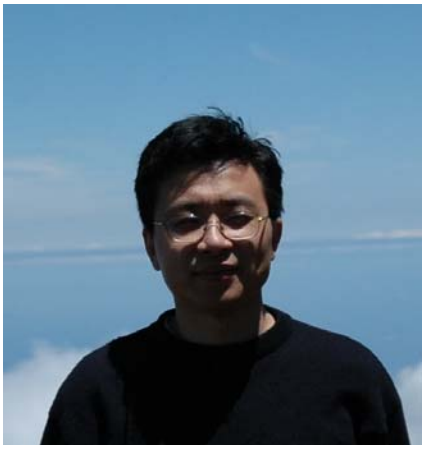
Dahai Xu, Jeffrey Dwoskin, Jianwei Huang, Mung Chiang and Ruby Lee

Department of Electrical Engineering
Princeton University
Princeton, NJ 08544
Email: dahaixu@princeton.edu

ABSTRACT

In lightweight mobile ad hoc networks, both probabilistic and deterministic key management schemes are fragile to node fabrication attacks. Our simulation results show that the Successful Attack Probability (SAP) can be as high as 42.6% with the fabrication of only 6 copies from captured nodes comprising only 3% of all nodes. We propose two low-cost, secure-architecture-based techniques to improve the security against such node fabrication attacks. Our new architectures, specifically targeted at the sensor-node platform, protect long-term keys using a root of trust embedded in the hardware System-on-a-Chip (SoC). This uses a reduced version of the SP (Secret Protected) architecture for microprocessors that is more suitable for low-cost sensors and SoCs. The new reduced-SP features in the SOC prevent an adversary from extracting protected long-term keys from a captured node to fabricate new nodes. The extensive simulation results show that the proposed architecture can significantly decrease the SAP and increase the security level of key management for mobile ad hoc networks.

BIOGRAPHY



Dr. Dahai Xu is currently a Postdoctoral Research Associate in the Department of Electrical Engineering at Princeton University. He received his Ph.D. degree in Computer Science and Engineering from University at Buffalo in 2005. His research interests include survivability and restoration in IP/MPLS, optical networks, network design and protocol development for next generation Internet and performance

evaluation (modeling, simulation and measurements). More information can be found at http://www.princeton.edu/~dahaixu/.

T5 – Technical Session 5: System-on-Chip (I)

System-on-Chip Solution for Non-Copyable Disk

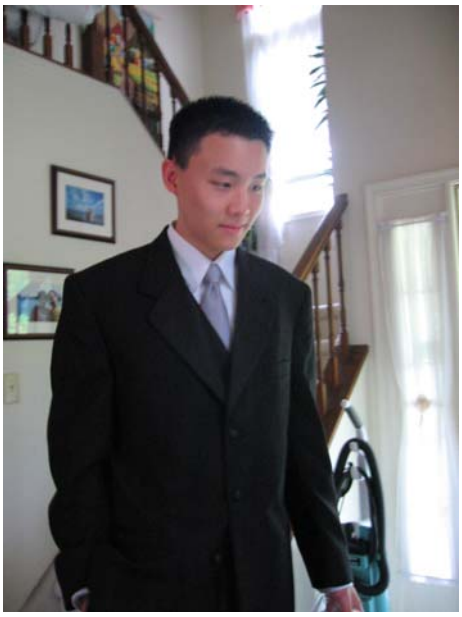
Michael S. Wang and Ruby Lee

Department of Electrical Engineering, Princeton University
Princeton, NJ 08544
Email: mswang@princeton.edu

ABSTRACT

Today, the piracy of copyrighted digital contents, such as music, movies, books, etc, is a big problem. A single piece of digital material may be repeatedly copied and proliferated throughout the internet with ease. We propose a non-copyable disk (NCDisk) that protects digital contents against piracy. Any digital content written onto the NCDisk can only be read through this NCDisk and may not be copied to and read on other devices. We design a SoC that is added onto existing disk architecture to attribute the disk with the non-copyable property. We further present the threat model and security protocol for the digital content piracy scenario. Finally, we perform security analysis to show that the SoC-based NCDisk, when used along with the security protocol, is a feasible and practical solution for the piracy problem.

BIOGRAPHY



Michael Wang is an undergraduate student at Princeton University, Class of 2008. He is pursuing a degree in Electrical Engineering and a Finance Certificate. Michael has conducted two semesters of independent research and spent two summers as the undergraduate research assistant for Professor Ruby Lee at PALMS Lab, Princeton

University. His research work includes encoding the ISA (Instruction-Set Architecture) of the PAX cryptographic processor, developing an assembler and simulator toolset for the PAX processor, implementing the PAX processor on a FPGA, and designing the NCDisk architecture. His research interests include computer architecture, computer security and VLSI design.

B1– Business Session 1: Biotech/Pharma Keynote

Session Chair

Alex Chang, Ph.D.

Associate Director of Business Development
Caliper Life Sciences
Discovery Alliances & Services Division (Xenogen Biosciences)
5 Cedar Brook Drive
Cranbury, New Jersey 08512 USA
E-mail: alex.chang@caliperls.com
Phone: 609-235-1413

ABSTRACT

With this year's conference we are introducing a Business track with four sessions (B1, B2, B3, B4) focused on biotechnology/medical devices and entrepreneurship. B1 is a keynote address from the CEO of a successful biotechnology start-up. B2 features three speakers who will cover aspects of pharmaceutical marketing, an area which is crucial for young biotechnology companies developing drugs to understand, even though they may discount the need as being far off in the future. B3 introduces two young but established start up companies who will describe their business plans to receive real-time feedback from a panel of venture capitalists. Finally, B4 is a panel of entrepreneurs who will talk about the challenges they've faced in starting their companies.

Dr. Geert Cauwenagh, the founding CEO of Barrier Therapeutics, will deliver the keynote address for the Business track in session B1. Barrier Therapeutics is a publicly traded pharmaceutical company which is focused on developing and commercializing products in the field of dermatology. The company made rapid progress from its founding in 2001 as a spinout of Johnson & Johnson, to their first private equity round in May 2002, to a $75 million IPO in April 2004. Dr. Cauwenagh will describe his experiences leading the company since its inception, including key factors which contributed to Barrier's success.

BIOGRAPHY

Alex Chang, Ph.D., recently joined the Caliper Life Sciences' Discovery Alliances & Services Division, formerly Xenogen Biosciences, as an Associate Director of Business Development. Caliper and Xenogen have combined to create a unique new company with proprietary molecular imaging, microfluidics and automation products and services. The new company is focused on improving the correlation between *in vitro* and *in vivo* experimentation in order to improve the productivity of drug discovery and development.

Alex earned a Ph.D. from Mount Sinai School of Medicine, New York University, and a B.A. in Biochemistry at Rutgers College, New Brunswick. Prior to graduate school from 1993 to 1995, Alex began his career at Hoffman-LaRoche and developed test kits

employing PCR technologies. As a graduate student from 1995 to 2000, his doctoral dissertation in the biomedical sciences concentrated on cellular pathways activated in many diseases including Cancer, Alzheimer's disease and Liddle's Syndrome. As post-doctoral fellow at ImClone Systems from 2000 to 2002, he focused on cancer therapeutics and analyzed the effects of Vitamin D against cancer cell lines. At Kelly Scientific Resources from 2003 to 2005, he provided laboratory personnel, bench scientists, chemical operators, clinical trials managers and medical directors, to companies employing scientists in Central New Jersey in industries such as chemical, pharmaceutical and biotechnology. The branch in Central New Jersey grew from $900,000 to $2 Million dollars in sales. In the past three years at the Biotechnology Council of New Jersey, Alex rose from the Membership Development Director to Director of Business Development. He grew the membership base by 100%; connected biotechnology companies in New Jersey to resources such as venture capitalists, laboratory supplies, employee benefits, and finance and legal experts; developed new marketing and financing strategies for events; and created new educational forums for scientists and entrepreneurs in focused areas such as human resources, finance, clinical trials, legal, business development, and executive officers. He brings many years of business development experience from both pharmaceutical and biotechnology industries to Caliper Life Sciences.

B1 - Business Session 1: Biotech/Pharma Keynote

GEERT CAUWENBERGH, PH.D.

Chief Executive Officer and Founder
Barrier Therapeutics
gcauwenbergh@BARRIERTHERAPEUTICS.COM

BIOGRAPHY

Geert Cauwenbergh, Ph.D., Chief Executive Officer and Founder of Barrier Therapeutics. Prior to founding Barrier, Dr. Cauwenbergh was Vice President of Technology of the Johnson & Johnson (J&J) Consumer and Personal Care Products Companies. In this capacity, he created technology platforms based on intellectual property and know-how owned by Johnson & Johnson, and developed a business proposition around these platforms as the basis for new companies or new businesses within J&J. The creation of Barrier Therapeutics as a separate company devoted to the clinical development and commercialization of dermatological products in-licensed from J&J affiliates is a direct consequence of his efforts in this area. Dr. Cauwenbergh is also a member of the Board of Trustees of the Biotechnology Council of New Jersey and the New Jersey Center of Life Sciences and also serves as an Official Trade Advisor to the Belgian Government for Health Care in the USA. In 2004 Dr. Cauwenbergh was an Inductee of the New Jersey High Tech Hall of Fame.

Previously, Geert served as Vice President of Research & Development of the J&J Consumer Companies Worldwide, managing a global organization of over 100 people, with an annual budget of $35 million, and he also was a member of the J&J Business Development Council. In 1994, Dr. Cauwenbergh became Vice President of Product Development and a member of the Management Board of the US J&J Consumer Company. He also was the Director of the Corporate Skin Care Council of J&J, coordinating the skin care activities in the different operating groups of the Corporation. Earlier in his career, he held positions in sales, and national and international marketing, and he was responsible for the successful global introduction of Nizoral® (ketoconazole). Geert joined the R&D organization of the Janssen Research Foundation

in 1982, where he held positions of increasing global responsibility and oversaw development of drugs such as Sporanox®, Nizoral® Shampoo, Terazol®, and topical Sufrexa®. His R&D activities have also involved him in the fields of psoriasis, acne, wound healing, atopic dermatitis, protozoal infections, and HIV.

Dr. Cauwenbergh has authored over 100 publications and co-authored several books. He received his Ph.D. in Medical Sciences from the Catholic University of Leuven, Faculty of Medicine, where he also completed his Masters and undergraduate work.

Keynote Session

From Research to Social Change

Professor Gregory C Chow

Class of 1913 Professor of Political Economy, Emeritus
Princeton University
gchow@princeton.edu

ABSTRACT

This lecture outlines the several steps going from research to changes in society, including the understanding of how research results can be applied, how a suitable policy can be formulated based on knowledge, how such a policy can be communicated to policy makers for adoption and how an adopted policy can be implemented in practice to change society. Experience in economic policy advice to the governments of Taiwan and China mainland will be cited as illustrations. The main lessons from this experience will be summarized.

BIOGRAPHY

Gregory Chow is Professor of Economics and Class of 1913 Professor of Political Economy, Emeritus, at Princeton University. He was Chairman of the American Economic Association's Committee on Exchanges in Economics with the People's Republic of China from 1981 to 1994 and was Co-chairman of the U.S. Committee on Economics Education and Research in China with support from the Ford Foundation from 1985 to 1994. He was a member of the U.S.-Hong Kong Economic Co-operation Committee. He has been appointed Honorary Professor at Fudan , Shandong , the People's , Hainan, Nankai and Zhongshan Universities, and the Graduate University of the Chinese Academy of Sciences; Honorary President of Lingnan (University) College. He received an Honorary Doctor's Degree from Sun Yat-sen University and an LL.D. from Lingnan University in Hong Kong. He has advised the Chinese State Education Commission on economics education, the Prime Minister and the State Commission for Restructuring the Economic System on economic reform in China. His has published over 200 articles and twelve books, including [possibly omit:Demand for Automobiles in the United States, 1957; Analysis and Control of Dynamic Economic Systems, 1975; Econometrics, 1983; The Chinese Economy, 1985; Understanding China's Economy, 1994;] Dynamic Economics: Optimization by the Lagrange Method, 1997; China's Economic Transformation, 2002 and

2007; and Knowing China, 2004. At his retirement from Princeton in 2001, the Econometric Research Program was renamed the Gregory C Chow Research Program in his honor.

Keynote Session

Past, Present, and Future of Silicon IC Technology

T.P. Ma

Raymond J. Wean Professor, Department of Electrical Engineering
Yale University
New Haven, CT 06520-8284
Tel: 1-203-432-4211 ; Fax: 1-203-432-7769
Email: t.ma@yale.edu

ABSTRACT

The world we live in has experienced dramatic changes brought about by the rapid advances in semiconductor technology. Many believe that the so called "electronics revolution" was launched with the invention of the transistor more than 50 years ago, and it really began to take off when the integrated circuit (IC) was first introduced over 4 decades ago. Since then, the tremendous progress in the electronics industry has been riding on the exponential growth of the IC technology, as characterized by the "Moore's Law", which basically says that the information storage capacity of a silicon chip, as well as its information processing power, doubles every 18 months. Since the cost of a silicon chip has remained more or less constant over the years, an average consumer now may possess more computing power than a supercomputer did in the early 80's that cost a few million dollars then. The Internet and various smart appliances that so many of us take for granted today are all made possible because of the ever more powerful IC's. If the Moore's Law can be sustained for a few more decades, which many experts believe will, what lies ahead will make our current society look like the Stone Age in terms of technology sophistication. It's been said that, had the automobile industry progressed at the same rate as that of the silicon chip in the last few decades, today we should have a car that can go around the world within minutes on a gallon of gas. And it should only cost a few dollars to make.

What makes the silicon chip tick? Why is the electronics industry growing so fast? This talk will give an overview of the silicon IC technology and its applications, with a preview of what's to come in the future.

BIOGRAPHY

T.P. Ma is Raymond J. Wean Professor of Electrical Engineering at Yale University, where he has been a faculty member since 1977. He also serves as the Director of Yale Center for Microelectronics, and a Co-Director of the Yale-Peking Joint Center for Microelectronics and

Nanotechnology. In 1974 he graduated from Yale University with a Ph.D. degree and went to IBM, where he did research work on advanced silicon device technology and ionizing radiation effects in MOS devices. His research and teaching at Yale have focused on semiconductors, MOS interface physics, ionizing radiation and hot electron effects, advanced gate dielectrics, flash memory device physics, and ferroelectric thin films for memory applications. He is a patent holder, co-editor of a book, has given numerous invited talks and contributed to several book chapters as well as over 200 research papers. He has been actively involved in organizing, chairing, or serving as committee members in numerous technical conferences. He is a member of the US National Academy of Engineering (NAE), a Fellow of IEEE, a Member of the Connecticut Academy of Science and Engineering (CASE), a life member of the American Physical Society, and a member of the ECS, MRS, Sigma Xi, and Yale Science and Engineering Association (YSEA). He has received the 2006 SIA (Semiconductor Industry Association) University Researcher Award, the 2005 IEEE Andrew S. Grove Award, a 2005 Pan Wen-Yuan Research Award, a 1998 IEEE EDS Paul Rappaport Award, two B.F. Goodrich National Collegiate Inventor's Advisor Awards in 1993 and 1998, respectively, the 1991 Connecticut Yankee Ingenuity Award, and the 1975 Harding Bliss Prize at Yale University. He holds Honorary Professorship at Tsinghua University, Tianjin University, and the Chinese Academy of Sciences, and Honorary Guest Professorship at Peking University as well as Advisory Professorship at Fudan University..

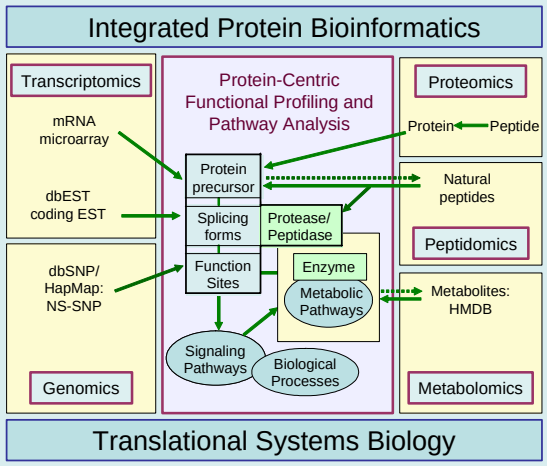
Keynote Session

Integrated Protein Bioinformatics for Translational Systems Biology

Cathy H. Wu

Professor, Department of Biochemistry and Molecular & Cellular Biology
Director, Protein Information Resource (PIR)
Georgetown University Medical Center (GUMC)
Washington, DC 20007
Tel: 202-687-1039, Fax: 202-687-0057
Email: wuc@georgetown.edu

ABSTRACT



Systems integration is becoming the driving force for the 21st century biology. Researchers are systematically tackling gene functions and complex regulatory processes by studying organisms at different levels of organization, from genomes, transcriptomes, proteomes, peptidomes, to metabolomes and interactomes. These studies provide a global view of gene function and temporal and spatial regulation of genes in different disease states. To fully realize the value of such high-throughput data requires advanced bioinformatics for integration, mining, comparative analysis, and functional interpretation. We are developing a protein-centric bioinformatics framework for functional and pathway analysis in the systems biology context. The integration of bioinformatics tools with a large number of biomedical databases in such a framework will support associative analysis of expressed genes, proteins, peptides, metabolites and pathways; thereby revealing hidden interrelationships among the various components of the biological systems. The integrative approach will allow researchers to ask complex biological questions, gain better understanding of disease processes, and facilitate biomarker and drug target discovery.

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BIOGRAPHY

Academic/Professional Appointments (current)

- Professor, Department of Biochemistry and Molecular & Cellular Biology, GUMC
- Professor, Department of Oncology, GUMC
- Director, Protein Information Resource, GUMC
- Council, Human Proteome Organization (HUPO)
- Advisory Board, Protein Data Bank (PDB)
- Advisory Committee, Protein Structure Initiative, NIGMS, National Institutes of Health (NIH)
- Cyberinfrastructure User Advisory Committee, National Science Foundation (NSF)
- Education Committee, International Society for Computational Biology (ISCB)
- Advisory Board, Association of Chinese Bioinformaticians

Brief Bio

Cathy H. Wu received her B.S. in Plant Pathology from National Taiwan University in 1978 and Ph.D from Purdue University in 1984. She conducted postdoctoral research in molecular biology, and later obtained a second M.S. degree in Computer Science. With background and experience in both biology and computer science, she has conducted bioinformatics research since 1990. She has developed several protein classification systems and databases, and led the PIR since 1999. Dr. Wu has served on several advisory boards and many bioinformatics grant review panels at NIH, NSF and DOE. She has served on numerous Program Committees for international bioinformatics and proteomics conferences, such as the International Conference on Intelligent Systems for Molecular Biology (ISMB) and the HUPO World Congress. She has published more than 120 peer-reviewed papers and three books, and is a frequent invited speaker. Her research interests include protein family classification and functional annotation, protein structure-function analysis, biological data integration, proteomic informatics, and biomedical text mining and ontology.

About the Protein Information Resource (PIR)

PIR provides bioinformatics resource to support proteomics and systems biology research. It is a member of the UniProt Consortium to provide the central resource on protein sequence and function, and is a key member of the NCI caBIG (cancer Biomedical Informatics Grid) program and the NIAID biodefense proteomics program. PIR also leads the Protein Ontology consortium to develop an ontology of protein evolution and protein modified forms. The PIR web site and the UniProt web site at PIR are accessible by researchers worldwide with over 4 million hits per month from over 100,000 unique sites.

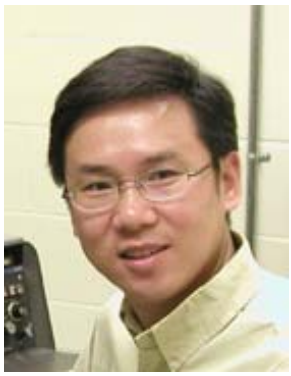
T6 - Technical Session 6: Nanotechnology (II)

Session Chair

Lei Zhu

Assistant Professor, Institute of Materials Science and Department of Chemical, Materials and Biomolecular Engineering, University of Connecticut, Storrs, Connecticut 06269-3136
Tel: 860-486-8708, Fax: 860-486-4745
Email: lei.zhu@uconn.edu

BIOGRAPHY



Lei Zhu was born in Shanxi Province, China, in 1972. He received his B.S. degree in Materials Chemistry in 1993 and M.S. degree in Polymer Chemistry and Physics in 1996 from Fudan University. He received his Ph.D. degree in Polymer Science from University of Akron in 2000. After two-year post-doctoral experience at the Maurice Morton Institute, University of Akron, he joint Institute of Materials Science and Department of Chemical, Materials and Biomolecular Engineering at University of Connecticut, as an assistant professor. In 2007, he is awarded tenure and promoted to associate professor. His research interests include supramolecular self-assembly of discotic liquid crystals, organic-inorganic hybrid nanomaterials, and polyelectrolyte membrane fuel cells. He is recipients of NSF Career Award, 3M Non-tenured Faculty Award, and DuPont Young Professor Award.

T6 - Technical Session 6: Nanotechnology (II)

Physical, Chemical and Biological Properties of Metals at the Nanoscale Dimension

Chuan-Jian Zhong

Department of Chemistry
State University of New York at Binghamton
Binghamton, New York 13902
Phone: 607-777-4605; Email: cjzhong@binghamton.edu
Web page: http://chemistry.binghamton.edu/ZHONG/zhong.htm

ABSTRACT

This presentation describes recent findings of our investigations of the physical, chemical, and biological properties of metal and oxide nanoparticles. The understanding of these properties in the nanoscale dimension is extremely important for exploring these nanomaterials as building blocks towards many areas of nanotechnological applications. One area involves nanostructured catalyst materials, which requires the understanding of the synergistic surface interactions and reactivities of monometallic, multimetallic, and core-shell nanoparticles of different compositions, sizes, and shapes. Another area involves nanostructured sensing materials, which requires the understanding of the electronic, optical and magnetic properties of nanoparticle assemblies with controlled interparticle molecular or biomolecular interactions. The new insights into these nanoscale physical, chemical, and biological properties and their implications to the development of fuel cell technology, sensors and biosensors will be discussed.

BIOGRAPHY

Dr. Chuan-Jian Zhong is a Professor at State University of New York at Binghamton. After receiving his Ph.D. from Xiamen University, he did postdoctoral research work at Fritz-Haber-Institute, Germany and University of Minnesota. He was an associate scientist in Ames Laboratory at Iowa State University before joining the faculty of the Chemistry Department at State University of New York at Binghamton in 1998. His research interests are in the interdisciplinary areas of materials chemistry, analytical chemistry, physical chemistry, catalysis, electrochemistry, and the emerging fields of nanotechnology, focusing recently on novel nanoparticles, assemblies, fuel cell catalysts, and, sensors/biosensors. His research activities have been supported by NSF, NSF-CAREER, DOE, DoD, PRF, WGC, NYSTAR, and several industrial companies including 3M and Honda. He is a co-founder of NSC Technology.,

a nanotechnology start-up company located at Binghamton, New York. He has authored and coauthored over 100 peer-reviewed scientific papers, 5 book chapters, and is inventor/co-inventor of 5 US patents.

T6 - Technical Session 6: Nanotechnology (II)

Biomaterials for Vocal Fold Tissue Regeneration

Xinqiao Jia

Assistant Professor, Materials Science and Engineering Department
University of Delaware, 201 Dupont Hall
Newark, DE 19711
Tel: 302-831-6553, Fax: 302-831-4545
Email: xjia@udel.edu

ABSTRACT

Human vocal fold consists of a pliable vibratory layer of connective tissue, known as the lamina propria, sandwiched between epithelium and muscle. During normal phonation, vocal folds sustain more than 100 collisions per second. When the pliability of this complex biomechanical system is reduced by scarring, voice quality may be compromised. Despite a well-recognized clinical need for a material to replace missing or damaged vibratory connective tissue of the vocal fold, materials have yet to be engineered specifically for this purpose. We have synthesized and evaluated hyaluronic acid (HA)-based hydrogels with different molecular architectures and tunable mechanical properties for vocal fold restoration. HA-based graft copolymers were prepared by covalent conjugation of poly(2-hydroxyethyl methacrylate) to HA (HA-g-PHEMA). Chemical modification of HA-g-PHEMA with glycidyl methacrylate (GMA) followed by UV irradiation resulted in a bulk gel that is enzymatically stable. HA-based soft hydrogel particles (HGPs) with controlled size, chemistry and structure were prepared by inverse emulsion crosslinking technique. Depending on the HA precursors used, these HGPs may exhibit residual functional groups that can be used as reactive handles for subsequent crosslinking with other functional polymers, giving rise to macroscopic hydrogels with tunable viscoelasticity. Alternatively, post modification of HGPs allows for the introduction of functional groups for subsequent crosslinking. In vitro cytotoxicity studies using vocal fold fibroblasts indicate that these HA-based hydrogel materials are well-tolerated by the cells. Novel mechanical experiments were carried out in order to measure the viscoelastic properties of the synthetic materials and vocal fold tissue at phonation frequency range. These HA-based hydrogels are promising biomaterials for vocal fold regeneration.

BIOGRAPHY

Xinqiao Jia received her B.S. in Applied Chemistry from Fudan University in China in 1995 and his Ph.D. in Polymer Science and Engineering from the University of Massachusetts Amherst in 2002. She carried out her postdoctoral training with Prof. Robert Langer at Massachusetts Institute of Technology prior to joining the Materials Science and Engineering Department at the University of Delaware in 2005. She is an affiliated faculty with several centers and institutes at UD that include the Center for Translation Cancer Research, Delaware Biotechnology Institute, Integrative Graduate Education & Research Traineeship Program, and Graduate Program at the Chemistry/Biology Interface. She received the NSF CAREER Award in 2006 to develop mechano-responsive biomaterials.

Xinqiao Jia's current research interests is focused on the design, synthesis and characterization of biomimetic materials with controlled architectures and functionalities for biomedical applications. Her research activities are currently supported by National Science Foundation and National Institutes of Health. She has authored and coauthored 17 peer reviewed scientific papers since she started her MS thesis work in 1998.

T6 - Technical Session 6: Nanotechnology (II)

Synthesis and Characterization of Glucose-Responsive Microgels and Nanoshells

Shuiqin Zhou

Associate Professor, Department of Chemistry
City University of New York, College of Staten Island
Tel: 718-982-3897
Fax: 718-982-3910
Email: zhoush@mail.csi.cuny.edu

ABSTRACT

Novel Glucose-sensitive microgel particles were prepared based on thermal sensitive poly(N-isopropylacrylamide) in aqueous phase. The microgel particles can swell enormously and rapidly with an increase in glucose concentrations at room temperature. The glucose sensitivity of the microgels could be controlled through the ionic strength as well as the amount of functional groups in the polymer network chains. To study the permeability of hydrogel in nanoscale thickness, core-shell microgels with degradable poly(N-isopropylacrylamide) (PNIPAM) as core and nondegradable phenylboronic acid (PBA)-conjugated poly(N-isopropylacrylamide) [P(NIPAM-PBA)] as shell were designed and synthesized. Laser light scattering was used to study the volume phase transitions and core degradation behavior of the core-shell microgels. The release of the degraded core polymer chains can be conveniently followed by turbidity change. At room temperature, the degraded polymer segments diffuse freely out of the precursor poly(N-isopropylacrylamide-co-acrylic acid) nanoshells in water. In contrast, the PBA-modified P(NIPAM-PBA) nanoshell can hold most of the degraded core polymer chains under the same conditions, thanks to its condensed structure at the collapsed state. Lowering temperature or increasing pH increases the swelling degree of the P(NIPAM-PBA) shell, which provides methods to control its permeability by temperature and pH. The complexation of PBA groups with glucose also enhances the swelling of the nanoshell, and thus increases its permeability. The understanding of how to control the permeability of the glucose-sensitive gel nanoshell in hollow microgel particles is very important for further design of self-regulated insulin delivery systems.

BIOGRAPHY

Shuiqin Zhou was born in Zhejiang, China. She received her B.S. (1988) and M.S. (1991) degrees from Department of Chemistry, Xiamen University, P.R.China, and the Ph.D. (1996) degree from The Chinese University of Hong Kong. She worked as a Postdoctoral Research Associate in SUNY

at Stony Brook with Professor Benjamin Chu during 1996-2000, and a Senior Chemist in Union Carbide/The Dow Chemical Company during 2000-2002 before she joined to CUNY-CSI.

Shuiqin Zhou is currently an Associate Professor of the Department of Chemistry, College of Staten Island and Graduate Center, City University of New York. Her group is currently focusing on the researches of (1) nanostructured functional materials from fullerene derivatives, fullerene-polymer composites, and conjugated polymers; (2) Reponsive hydrogel particles and nanoshells for sensing and drug delivery applications; (3) supramolecular assembled polymer-lipid complexes as well as polyelectrolyte-surfactant complexes for personal care products. Her researches are supported by the National Science Foundation, The Degussa Incorporation, and The Dow Chemical Company. She has published 65 reviewed research papers and book chapters.

Shuiqin Zhou is a member of American Chemical Society and American Association for the Advancement of Science.

T6 - Technical Session 6: Nanotechnology (II)

Highly Conductive Carbon Nanotube Composite Networks for Flexible Electronics and Biosensors

Huixin He

Assistant Professor, Chemistry Department
Rutgers, The State University of New Jersey at Newark
73 Warren Street, NJ 07102
Tel: 973-353-1254 , Fax: 973-353-1264
Email: huixinhe@newark.rutgers.edu

ABSTRACT

There is an increasing enthusiasm for the use of SWNT networks as conductive flexible electrodes for a wide variety of applications. However, all the reported conductivities of the SWNT networks were significantly lower than that of a SWNT rope (axial conductivity). This has been attributed to the high contact resistance between tubes in the network. We found that the contact can be greatly improved by in-situ polymerization of a thin layer of conductive self-doped polyaniline (polyaniline boronic acid, PABA) on the carbon nanotubes. The conductance of the composite network can be five orders of magnitude higher than the SWNTs network. Furthermore, the PABA can be used as a polyaniline precursor to fabricate a wide range of substituted polyanilines. Thus, the functionality of the boronic acid functional group and the highly improved performance of the PABA/SWNT composite networks may stimulate development of a broad range of applications, especially in high performance flexible electronics and sensors. However these advantages cannot be obtained by simply mixing the preformed polymer with the ss-DNA/SWNTs. We also found that these advantages cannot be obtained by the "seed approach", where monomers were *in-situ* polymerized in the presence of pre-oxidized ss-DNA/SWNTs, even though this approach has been reported to efficiently produce conducting polymer nanowires. Herein I will present how the electronic structures and surface chemistry of the carbon nanotubes impact the electronic performance of the produced composite for electronic and biosensor applications.

BIOGRAPHY

Dr. Huixin He received her PhD in Peking University, China in 1997. She joined National University of Singapore as a research associate, working mainly on plastic microfluid channels

and micropatterns by soft lithography. In 1999, she came to the United States working with Professor Nongjian Tao, first in Florida International University and then Arizona State University. At this period time, she was mainly working on molecular electronics, including the electronic properties of metallic quantum wires and single chain conducting polymer wires. In 2002, she joined chemistry department, Rutgers University at Newark, as an assistant professor. Her current research interests include conducting polymer nanocomposite, especially in the fundamental study of interaction at interfaces in the composite. She is also actively working on developing sensitive and selective chemical and biosensor, nonviral gene delivery system using these nanocomposites and other nanomaterials.

T6 - Technical Session 6: Nanotechnology (II)

Development of Nanofiber Membranes to Improve Medical Surgery

Dufei Fang[1], Benjamin Hsiao[2] and Ben Chu[2]

[1]Stonybrook Technology and Applied Research (STAR), Inc., P.O. Box 1336, Stony Brook, NY 11790
[2]Stony Brook University, Chemistry Department, Stony Brook, NY 11794-3400
Email: dfang@notes.cc.sunysb.edu

ABSTRACT

We have successfully developed a unique esJets™ technology at STAR, Inc. and University of Stony Brook. This key technology permits fabrication of membranes with composite nanofiber/nanoparticle hybrid morphology, designed composition variations from polymer solutions. Using this technology, we developed a series new functional material for applications to the medical, biological and chemical science communities. Our first targeting medical product is anti-adhesion barrier/medication delivery systems in post-operative surgery. Adhesions are mainly induced from the trauma of surgery and can lead to serious complications, including pelvic pain, small bowel obstruction, female infertility, chronic debilitating pain and difficulty with future operations. The result shows that our nanofibrous membrane can effectively prevent the post surgical adhesions. We have been awarded to Phase I Phase II SBIR from NIH.

BIOGRAPHY

Dufei Fang received his B.S. in physics from University of Science and Technology of China and his Ph.D. in physics from Fudan University and Duke University (joint). He then went back to Fudan University as assistant professor, associate professor and professor of physics in the year from 1988 to 1997. He was a group leader at the Institute of Modern Physics and also a visiting fellow at Fitzwilliam College, Cambridge University (U.K.). He is an experimental physicist with background in accelerator physics and plasma physics. He has extensive experience in the instrumentation design and construction for free electron laser and synchrotron X-ray facilities. He came to the Department of Chemistry, Stony Brook University in 1997 as senior research scientist. He devoted much of his efforts on development of instrumentation for x-ray study of polymeric materials. He is also a co-founder (together with Benjamin Hsiao and Benjamin Chu) of Stonybrook Technology and Applied Research, Inc., a biomedical start-up company located at Stony Brook, New York.

Dufei Fang currently is the Technology Director of Stonybrook Technology and Applied Research, Inc. (STAR). He is concentrated in development of instrumentation of fabrication of nanofibrous membranes for biomedical applications.

T7 - Technical Session 7: Bioinformatics & Systems Biology (II)

David Chiang

Chairman & CEO
Sage-N Research,Inc. "The Integrated Data Appliance Company"
SORCERER IDAs Support SEQUEST,SCAFFOLD,TRANS-PROTEOMIC PIPELINE
408-200.6668 (Direct) 408-200.6660 (Main) 408-200.6661 (Fax)
david@SageNResearch.com http://www.SageNResearch.com

ABSTRACT

Mass spectrometry-based proteomics is used to systematically identify and characterize proteins and their modifications within biological samples. Proteomics technology holds great promise to uncover medical breakthroughs at the molecular level, but the requires the unprecedented ability to perform complex pattern matching in order to match the mass spectrum of a protein fragment to a subsequence within a protein sequence dataset.

A new specialized server, called the Integrated Data Appliance, is developed to apply recent advances in Field Programmable Gate Array semiconductor technology and proprietary search engine software technology to improve the speed and sensitivity of the pattern matching application.

The Sorcerer™ IDA technology will be shown to make possible the routine analysis of millions of mass spectral data-points per day in search of early detection biomarkers of cancer and other debilitating diseases.

BIOGRAPHY

David Chiang is the Founder and Chief Executive of Sage-N Research Inc., which develops the Sorcerer™ line of specialized servers called Integrated Data Appliances (IDAs) for low maintenance, high throughput proteomics analysis. He is a popular speaker who has given talks at proteomics seminars and conferences, and was a panel speaker at HUPO 2006. Prior to founding Sage-N Research, David served in executive positions in marketing and development at leading Silicon Valley companies Xilinx and Altera. He is the lead inventor or co-inventor of 28 U.S. patents and numerous international patents in hi-tech, and has several patents pending in the area of proteomics analysis. He is also a business advisor to startup

companies and is a member of the Sand Hill Angels private investment group. David holds BS and MS engineering degrees from MIT.

T7 - Technical Session 7: Bioinformatics & Systems Biology (II)

Tools and Resources for Alternative Splicing

Hongfang Liu

Assistant Professor
Department of Biostatistics, Bioinformatics, Biomathematics
Georgetown University Medical Center
Building D, Room 180
4000 Reservoir Rd, NW
Washington, DC 20007
Tel: 202-687-7933, Fax: 202-687-2581
Email : hl224@georgetown.edu

ABSTRACT

The splicing reaction that assembles eukaryotic mRNAs from their much longer precursors provides one of the most important mechanisms of genetic regulation. Variability in splice patterns is a major source of protein diversity in higher eukaryotes. For example, based on experimental evidence and modeling data, the percentage of genes in human exhibiting alternative splicing is estimated to be from 30% to 99%. The expression of alternatively spliced genes is often specific to tissue type, developmental stage, environmental condition, or disease state. We present here a list of tools or resources for accurate genomics and proteomics data analysis for alternative splicing. This work is a joint research project with Genomics and Bioinformatics Group at NIH/NCI/LMP and Protein Information Resource at Georgetown University.

BIOGRAPHY

Hongfang Liu, PhD, is currently an Assistant Professor in Department of Biostatistics, Bioinformatics, and Biomathematics (DBBB) of Georgetown University. Prior to that, Dr. Liu worked at the Information Systems Department of University of Maryland at Baltimore County as an Assistant Professor. Dr. Liu received her BS degree in Applied Mathematics and Statistics from University of Science and Technology of China in 1994, the MS degree in Computer Science from Fordham University in 1998, and the PhD degree in computer science at the Graduate School of City University of New York in 2002. Her research interest includes biomedical text mining, machine learning and data mining, biomedical software engineering and development, and bioinformatics specialized in biomedical databases and micro-array data analysis.

T7 - Technical Session 7: Bioinformatics & Systems Biology (II)

iProXpress System for Proteomic Data Analysis

Hongzhan Huang

Assistant Professor
Protein Information Resource
Department of Biochemistry and Molecular & Cellular Biology
Georgetown University Medical Center
3300 Whitehaven Street NW, Suite 1200
Washington, DC 20007
Tel: 202-687-3412, Fax: 202-687-0057
E-mail: hh42@georgetown.edu

ABSTRACT

Large-scale proteomic profiling of biological samples such as cells, organelles or biological fluids has led to the discovery of numerous key and novel proteins involved in many biological/disease processes including cancers, as well as to the identification of novel disease biomarkers and potential therapeutic targets. Such a data-driven research approach requires maximally utilizing the public data and knowledge bases for functional analysis and interpretation of the large-scale experimental data. This remains a major challenge due to the voluminous, complex, and dynamic data being maintained in heterogeneous sources. Advanced computational methods are needed for integration, mining, comparative analysis, and functional interpretation of the large-scale expression data. iProXpress, system is an integrated research and discovery platform for large-scale expression data analysis. The system contains three major components, a data warehouse of integrated protein information, analytical tools for sequence analysis and functional annotation, and a graphical user interface for functional analysis. The system performs three major functions on the expression data sets, namely protein mapping, functional annotation, and functional profiling. The unique features of the system include its comprehensiveness of protein sequence coverage and annotation, high protein mapping rate of expression data including protein spliced forms. The system has been applied to several studies including the expression profile analysis of hormone-induced changes in endocrine tumor cells.

BIOGRAPHY

Hongzhan Huang, PhD, is currently an Assistant Professor in Protein Information Resource (PIR) at Department of Biochemistry and Molecular & Cellular Biology of Georgetown University. Dr. Huang graduated from Zhongshan University and taught mathematics at South China Agricultural University in 1980's. He received his PhD in genetics at University of California, Davis in 1993. From 1994 to 1998, he was doing post doc researches in genetics and bioinfomatics in UC Davis and University of Texas Health Center at Tyler. He joined Protein Information Resource (PIR) in 1998 as a senior bioinformatics scientist and the bioinformatics team lead, and joined Georgetown University in 2002. He has been working on PIR and UniProt protein databases since 1998. His research interests include development of bioinformatics databases and software tools, sequence analysis, protein classification, micro-array and proteomics data analysis.

T8 - Technical Session 8: C4I (II)

Session Chair

Wei-Hsing Wang, Ph.D.

Co-founder and President, NicheUSA, L.L.C.
Email: wangwh@att.net

BIOGRAPHY

Dr. Wei-hsing Wang is the co-founder and president of NicheUSA, L.L.C., a thriving private company. The company's flagship product, ZoomerOne, based on patent pending technologies, offers freedom, savings, and power to both web site providers and web users. It is the only WIN-WIN solution on the market. The company is currently marketing ZoomerOne Study Propeller and Research Accelerator.

Before founding NicheUSA, L.L.C., Dr. Wang worked for BroadVision Inc. on Web sites personalization projects serving companies in the eastern region, such as Liberty Mutual, AIG, Merrill Lynch, and First Union Bank. Before joining BroadVision, he worked for AT&T Bell Laboratories in the areas of Network Database, Wireless Systems, and Internet Services at various locations in New Jersey.

Dr. Wang received his Ph.D. degree in computer science from Boston University, and B.S. and M.S. degrees in Computer Science and Information Engineering from National Taiwan University. He can be reached at Wang@NicheUSA.com or www.NicheUSA.com.

T9 - Technical Session 9: Emerging Energy Technology (II)

Session Chairs

Applications of Nanofluids to Improve Economics and Safety of Light Water Reactors

Lin-Wen Hu*, Jacopo Buongiorno

Massachusetts Institute of Technology
Cambridge, Massachusetts 02139, USA
* E-mail: lwhu@mit.edu, TEL: (617)258-5860

ABSTRACT

Recent research in nanofluids, colloidal dispersions of nanoparticles ranging in size from 1 to 100 nanometers in a base liquid, has shown dramatic increases in critical heat flux (CHF). Experiments in our lab have confirmed such findings and found CHF enhancement up to 80% in pool boiling and up to 30% in flow boiling with very low concentrations (<0.1vl%) of alumina nanoparticles in water. Since CHF is the upper limit of nucleate boiling, such enhancement offers the potential for major performance improvement in many practical applications that use nucleate boiling as their prevalent heat transfer mode. MIT is exploring the nuclear applications of nanofluids, specifically:

1) Main reactor coolant for PWRs
2) Coolant for the Emergency Core Cooling System (ECCS) of both PWRs and BWRs
3) Coolant for in-vessel retention (IVR) of the molten core during severe accidents in high-power-density LWRs

The first application could enable significant power uprates in current and future PWRs, thus enhancing their economic performance. Analytical study revealed that the use of nanofluids with at least 32% higher CHF could enable a 20% power density uprate in current plants without changing the fuel assembly design and without reducing the margin to CHF. The nanoparticles would not alter the neutronic performance of the system significantly. A RELAP5 analysis of the large-break loss of coolant accident in PWRs has shown that the use of a nanofluid in the ECCS accumulators and safety injection can increase the peak-cladding-temperature margins (in the nominal-power core) or maintain them in uprated cores, if the nanofluid has higher post-CHF heat transfer rate. The IVR application can increase the margin to vessel breach by 40% during severe accidents in high-power density systems such as Westinghouse AP1000 and the Korean APR1400. In summary, the use of nanofluids in nuclear systems seems promising, however several significant gaps are evident, including demonstration of the nanofluid thermal-hydraulic performance at prototypical reactor conditions and the compatibility of the nanofluid chemistry with the reactor materials. These gaps must be closed before any of the above applications can be implemented in a nuclear power plant.

BIOGRAPHY

Lin-wen Hu (Nuc Eng PhD, MIT, 1996; Nuc Eng MS, MIT, 1993) is the Associate Director for Research Development and Utilization at the MIT Nuclear Reactor Laboratory (NRL). She directs NRL's research program, irradiation services, and outreach activities and is responsible for the development, design, and safety reviews of major reactor experiments. Her research

interests include fluid dynamics and heat transfer, computational fluid dynamics simulations, research reactor applications, and instrumental neutron activation analysis (INAA) for medical and environmental research. Dr. Hu holds a Senior Reactor Operator license for the 5MW MIT Research Reactor issued by the US Nuclear Regulatory Commission, and is a licensed Professional Engineer in the State of Massachusetts. Among other professional activities, she served as the Chairperson of the Isotope and Radiation Division of the American Nuclear Society (ANS) and most recently as a member of the National Academies study committee on "State of the Science of Nuclear Medicine". The research projects she is currently working on include transport phenomena and two-phase heat transfer properties of nanoparticles colloids (nanofluids) funded by DOE's Infrastructure in Nuclear Innovations and Education (INIE) program, Idaho national laboratory, Electric Power Research Institute (EPRI), and AREVA; and MIT Research reactor conversion feasibility study funded by DOE's Reduced Enrichment Research and Test Reactor (RERTR) program.

T9 - Technical Session 9: Emerging Energy Technology (II)

Fuel Cell to Serve as Emergency and Standby Power for Critical Loads

Wei-Jen Lee

Professor and Director
Energy Systems Research Center
University of Texas at Arlington
Tel: (817) 272-5046; FAX: (817) 272-5042
Email : wlee@uta.edu

ABSTRACT

The business, technological, and environment of electric power system infrastructure is changing dramatically. New threats and vulnerabilities to the reliability and security of its infrastructure are rapidly emerging. On July 15, 1996, the White House Executive Order 13010 "Critical Infrastructure Protection" identified utility systems as one of the most vulnerable infrastructures in the United States. Electric Power Research Institute (EPRI) and the Department of Defense (DoD) initiated "Complex Interactive Networks/Systems Initiative" to address these issues. In addition to the critical infrastructure protection, the survivability of the critical loads during emergency should also be emphasized. The recent Northeast blackout reflects the weakness of the current approaches. As we know, a massive power failure hit the northeastern United States and part of Canada at approximately 4:11 PM (Eastern Time), August 14, 2003. It only took nine (9) seconds at the very last stage for the blackout to happen that affected more than 50 million people. During the event, Airports were paralyzed, subways were stopped, and some went without power for more than three days. Due to the complexity of the infrastructure, the sophistication of the interconnections, and the coverage of the service areas, it is difficult, if not impossible, to design and operate an economically feasible foolproof utility system. Regardless the efforts to improve the infrastructure of the power system, a blackout may still happen! The blackouts may be caused by natural/manmade disasters or the failure of other infrastructures. At the mean time, blackout can also trigger other disasters. It is critical to reduce the possibility and scale of the blackouts and minimize the levels of damage after the blackouts. One very important issue is how to secure the service continuity of the critical loads during the blackouts. Let's consider a not necessarily the "worst case scenario": If the Northeast blackout were due to a terror attack and the second assault were carried out by releasing chemical/biological agents when hundreds of thousands of people were trapped in the subways or jammed on the streets and bridges, the casualties would be unimaginable!

The installation of the distributed and/or disbursed generation (DG) is one of the most effective measures to increase the survivability of the critical loads during blackouts. After the price hikes and rotating blackouts in California, one has also realized that rejuvenating the idea of integrated resource planning and promoting the disbursed and/or distributed generation via traditional or renewable generation facilities is one of the best alternatives for the future utility industry. However, after examining the interconnection requirements of the distributed generation, it is necessary to develop holistic approaches to consider both load demand and generation facility to enable one of the most promising technologies, fuel cell, as emergency and standby power system to improve the survivability of critical loads during an emergency.

This seminar discusses the development of an integrated high-speed intelligent utility tie unit (IUT) to secure the critical loads by enabling the fuel cell/battery storage facilities to serve as emergency and standby power supply. Computer simulation and a scaled system is used to verify the proposed algorithm.

T9 - Technical Session 9: Emerging Energy Technology (II)

Nuclear Engineering Education and Research at NTHU

Keh-Chyang Leou

Professor, Engineering and System Science Department,
National Tsing Hua University, Taiwan/ROC
kcleou@ess.nthu.edu.tw

Chin Pan

Dean, College of Nuclear Science
National Tsing Hua University
Hsinchu, Taiwan, Republic of China
Email: cpan@ess.nthu.edu.tw

ABSTRACT

It has been more than 40 years since the nuclear engineering program was established in the National Tsing Hua University in Taiwan. The Nuclear Engineering Department has educated more than 3000 graduates, from college to doctoral levels, who have become the dominate force in Taiwan's nuclear power industry. The development of the nuclear program, however, has been hampered over the last two decades, as a result of concerns on safety of nuclear power plants and nuclear wastes, both globally and locally. In 1997, the name of the department was changed and the program, both curriculum and researches, has been diversified since then to a wide range of areas, including bio-nanotechnology, plasma science, and MEMS, etc. Due to the hiking of oil prices and global warming crisis in recent years, along with the advances in the safety of nuclear technology, nuclear power is now considered a highly competitive green energy, producing the least amount of green house gases as compared to other viable energy sources. In 2006, a new institute for graduate level education, the institute of Nuclear Engineering and Science, was established at the NTHU, to meet the strong local demand in the education/training of nuclear engineers, as well as to coordinate advanced research programs, in particular, for studies on the new generation IV reactors. The enrollment starts in the fall of 2007, for 15 master and 3 PhD students, initially. A special scholarship has also been pledged by the Taipower company, the major nuclear engineers employer, to attract more qualified students to the program. An overview of both the education program and current researches will be presented.

BIOGRAPHY

Name

Keh-Chyang Leou

Education

Ph.D. : Electrical Engineering, University of California, Los Angeles, June, 1994.
M.S. : Electrical Engineering, University of California, Los Angeles, June, 1991.
B.S. : Nuclear Engineering, National Tsing Hua University, Taiwan, June, 1982.

Professional Experience

August, 2007 - present, Professor, Engineering and System Science Dept., National Tsing Hua University, Hsinchu, Taiwan, ROC
August, 1995 - July 2007, Associate Professor, Engineering and System Science Dept., National Tsing Hua University, Hisnchu, Taiwan, ROC.
April, 1994 - July,1995, R&D Engineer, Electron Devices Division, Varian Associates, Palo Alto, California, USA.

Professional Membership

American Physical Society : Member since 1995
Institute of Electrical and Electronics Engineers : Member since 1995
American Vacuum Society : Member since 2001

Awards

Academic-industry Joint Research Award, Ministry of Education, ROC, 2003.

Research Interests

Plasma Science and Engineering, Microwave/millimeter-waves, Nanotechnology

T10 – Technical Session 10: System-on-Chip (II)

Session Chair

Zhijie Jerry Shi

Department of Computer Science and Engineering
University of Connecticut
Storrs, CT 06269
Email: zshi@engr.uconn.edu

BIOGRAPHY

Zhijie J. Shi is an assistant professor of Computer Science and Engineering at the University of Connecticut. He is the director of the Security and Architecture Laboratory at the University of Connecticut (SALUC). His current research interests are in the areas of computer architecture and computer security. He is interested in the security of computer systems including embedded systems and general-purpose processors. Specifically, he has been investigating the essential hardware that not only accelerates cryptographic algorithms but also provides efficient mechanisms for upper system layers such as operating systems and applications to achieve security goals. He is also interested in the design and application of new cryptographic algorithms that utilize novel operations to achieve the same level of security as existing ciphers but have higher performance and lower power consumption. In addition, he has been working on several projects in computer architecture, such as high-performance and low-power processor for multimedia information processing and sensor node and system designs for underwater wireless sensor networks. He is a member of Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineering (IEEE). He received his Ph.D. degree in Electrical Engineering from Princeton University in 2004 and the M.S. and B.S. degrees in Computer Science from Tsinghua University, Beijing, China, in 1996 and 1992, respectively.

T10 – Technical Session 10: System-on-Chip (II)

"Reconfigurable Hardware for Active Storage Networks"

John Chandy

Assistant Professor
Electrical & Computer Engineering
University of Connecticut
E-Mail: john.chandy@uconn.edu

ABSTRACT

Recent developments in object-based storage systems and other parallel I/O systems with separate data and control paths have demonstrated an ability to scale aggregate throughput very well for large data transfers. However, there are I/O patterns that do not exhibit strictly parallel characteristics. For example, HPC applications often use reduction operations that funnel multiple data streams from many storage nodes to a single compute node. We suggest another approach called active storage networks - namely putting intelligence in the network along with smart storage devices to enhance storage network performance. Active storage network hardware will be enabled with reconfigurable devices that allow functionality to change as required. This type of dynamic functionality requires operating system, library, and development tool support for reconfigurable computing. We will discuss an envisioned design flow that will allow for dynamic and flexible reconfigurable hardware support of computation.

BIOGRAPHY

Prof. John A. Chandy is an Assistant Professor of Electrical and Computer Engineering at the University of Connecticut. Previously he was Vice President of Engineering at Sigma Storage and involved in the design of clustered storage architecture. He was also co-founder of Internet companies Here2Listen.com, iChange Corp. and ShortCycles. Dr. Chandy earned Ph.D. and M.S. degrees in Electrical Engineering from the University of Illinois in 1996 and 1993, respectively, and a S.B. in Electrical Engineering from the Massachusetts Institute of Technology in 1989. The topic of his doctoral research was parallel algorithms for standard cell placement and masters research was in the area of reliable and high-performance storage architectures. His current research areas are in high-performance storage systems,

reconfigurable computing, distributed systems software and architecture, and VLSI design automation.

T10 – Technical Session 10: System-on-Chip (II)

Towards the Ideal On-Chip Interconnection Fabric

Li-Shiuan Peh

Assistant Professor of Electrical Engineering
Princeton University
peh@ee.princeton.edu

ABSTRACT

To continue to deliver Moore's Law performance, companies are moving towards multi-core and many-core chips in both general-purpose and embedded domains. While moving from a large monolithic core to a multi-core design will
ease the power consumption of the processor cores, the interconnection fabric's power consumption can be substantial and needs to be carefully designed.

In this talk, I'll show the significant power-performance gap that exists between the state-of-the-art interconnection fabric and the ideal interconnect of dedicated wires, and follow on with a discussion of our work to close this gap.

Next, I'll discuss our efforts in using the network not just for communications, but for managing on-chip data coherence as well, thereby improving performance beyond that of an ideal interconnect.

T10 – Technical Session 10: System-on-Chip (II)

Exploring Application-specific Instruction Set Processors for Security and Reliability Enhancement

Yunsi Fei

Assistant Professor
Electrical & Computer Engineering
University of Connecticut
Email: yfei@engr.uconn.edu

ABSTRACT

Program code in a computer system can be altered either by malicious security attacks or by various faults in microprocessors. At the instruction level, all code modifications are manifested as bit flips. In this talk, I will present a generalized methodology for monitoring code integrity at run-time in application-specific instruction set processors (ASIPs), where both the instruction set architecture (ISA) and the underlying microarchitecture can be customized for a particular application domain. We embed monitoring microoperations in machine instructions, thus the processor is augmented with a hardware monitor automatically. The monitor observes the processor's execution trace of basic blocks at run-time, checks whether the execution trace aligns with the expected program behavior, and signals any mismatches. Since microoperations are at a lower software architecture level than processor instructions, the microarchitectural support for program code integrity monitoring is transparent to upper software levels and the mechanism cannot be bypassed by software or compromised by malicious users, thus providing an effective detection measure. We proposed and compared two methods to manage the on-chip hash table that stores the expected program behavior: operating system controlled and compiler-assisted application-controlled. Experimental results show that our microarchitectural support can detect program code integrity compromises with small area overhead and little performance degradation.

BIOGRAPHY

Yunsi Fei received her B.S. and M.S. degrees with honors from the Department of Electronic Engineering of Tsinghua University, Beijing, China, in 1997 and 1999, respectively. She received her Ph.D. degree in Electrical Engineering from Princeton University in 2004. In August 2004, she joined the Department of Electrical and Computer Engineering at University of Connecticut as an assistant professor. Her current research interests include architecture enhancement in application-specific instruction set processors for security and reliability, embedded system and integrated circuit design automation, power analysis and optimization of ICs and systems, and mobile computing systems and sensor networks. Her projects are mainly supported by the National Science Foundation.

B2 - Business Session 2: US Pharmaceutical Markets

Session Chairs

Ming Tong, MD, MBE

Medical Director, Pfizer
Ming.Tong@pfizer.com

Tsang-Bin Tzeng, Ph.D.

Senior Director, Clinical Pharmacology
AstraZeneca Pharmaceutics
tsang-bin.tzeng@astrazeneca.com

ABSTRACT

Young biotechnology and medical device companies often discount the importance of marketing since they are many years from launching their first product. However, understanding marketing is vital for these companies' success. Selecting the best indications for a product, designing clinical trials that will support product adoption and not just regulatory approval, and negotiating the best deals with larger distribution partners all depend on a thorough understanding of the market for a company's product, and what it will take to sell the product.

Since 2006, there have been significant changes in the US pharmaceutical market, forcing companies to adapt to meet new challenges. This session consists of talks by three pharmaceutical marketing experts. Dr. Jun Huangpu from Verispan Consulting will review market changes since 2006 and provide a look ahead at the evolving industry climate. Dr. Kai Li from Johnson & Johnson will discuss some of the drug development and marketing strategies (for prescription products) that Big Pharma has developed in response to market changes. Dahai Guo from Inverness Medical will talk about branding strategies for over-the-counter (OTC) products. In addition, Dr. Ming Tong, a Medical Director at Pfizer, will provide a clinical perspective as session moderator.

BIOGRAPHY

Dr. Ming Tong (MD, MBE) studied Physics and Psychophysics under Nobel laureate Donald Glaser at University of California at Berkeley. He got his masters from Berkeley and Harvard with double majors in Bioengineering-Neurosciences and Medical Ethics. Prior to completing his MD degree from Boston Medical, he conducted Phase I & Phase II new drug investigations at the National Institutes of Health (NIH) Clinical Center. With collaborative research work of

receptor protein complex and cell biology at Yale, he published papers in scientific and medical journals of Experimental Neurology and Investigative Ophthalmology respectively, later his discovery of integrins receptors morphology in developmental human was posted on the front cover of Investigative Ophthalmology. Ming was also the first Chinese recipient of the Award in Research & Education Fund at Boston Medical from the national Radiology Society of North America (RSNA) while he was medical student and spent postdoctoral research in Nuclear Medicine. After working in 2 biotech companies with in-licensing compound expansion, thereafter he moved on to the pharmaceutical industry as assistant director of the Japanese Otsuka Pharma, then Global Medical Consultant for Sanofi-Aventis, Johnson & Johnson both on postmarketing drugs as well as drug development in clinical trials, was team leader at Novartis with more than 30+ drug products of various therapeutic areas covering 40+ countries and recently as Medical Director at Pfizer Headquarter in New York. Ming was also invited to be investment Advisory team for the Wall Street Standard & Poor (S & P) of Biotech & Pharmaceutical sector. Ming traveled many times to Europe and Asia for international medical and industrial conferences of new product development. Among his primary interests are biotech stocks, venture capital investment, Systems pharmacogenomics, in-licensing and re-purposing of drug compounds business development. Chinese wok cooking, fusion food culinary arts, Gospel music, literature hermeneutics, herbal- western medicinal combos, worldwide travel conference trips, intellectual mentoring, medical education systems and oceanic shark tank automation are his funs favorites.

BIOGRAPHY

Tsang-Bin Tzeng, PhD, is the Senior Director, Clinical Pharmacology at AstraZeneca Pharmaceutics since 2002. In this role he leads clinical pharmacology programs for several therapeutic areas, including a number of major neuroscience innovation initiatives. He has extensive experience in working as the leader in the study team on key clinical pharmacology, discovery medicine, and drug development issues for pharmaceutical industry. With his one-man effort throughout, he initiated and later led a team for the substance-abuse therapeutic development program at AstraZeneca.

Prior to joining AstraZeneca, he worked as an independent consultant in population pharmacokinetics and pharmacodynamics for major pharmaceutical companies for 4 years, as a faculty at School of Pharmacy, Temple University, for 6 years working in the preclinical area, and as a senior scientist at Drug Metabolism, Abbott Laboratory for 2 years. He also founded and ran a Phase I clinical pharmacology unit in Orlando, Florida.

Dr Tzeng carried out his undergraduate studies at School of Pharmacy, Taipei Medical College (1980), obtained his MS from School of Pharmacy, National Taiwan University with Professor Russell Rei-Long Chen, and his PhD (and later postdoctoral training) from Department of Pharmaceutics, State University of New York at Buffalo. He was one of the few pharmacy major

who passed Taiwan Government Pharmacy Advanced Examination (1980). He used to serve as a member of the Committee of Policy Group of Transition Team for New Jersey Governor-Elect Jon Corzine during his transitional period to take over Governor's job. He is currently holding an Adjunct Associate Professorship at Rutgers University and Advisory Council for the Dean of School of Nurse, University of Medicine and Dentistry of New Jersey. He is now serving his 3rd year term as a governor-appointed 4-year Board Director of Educational Opportunity Fund, New Jersey Government and as the Chairman for Monte Jade Science and Technology Association, Mid Atlantic Chapter. Also, he is the incumbent Executive Council for SAPA-Headquarter, for SAPA-Great Philadelphia, and for Chinese Institute of Engineers -USA, Greater New Yorker Chapter. He was in the editorial board of Journal of Chromatography for several years.

B2 - Business Session 2: US Pharmaceutical Markets

2006 Pharmaceutical Marketing Review

Jun Huangpu, Ph.D., MBA

Director, Versipan Consulting
jhuangpu@prismpharma.com

BIOGRAPHY

Jun Huangpu, Ph.D., MBA, Director, Verispan Consulting. Jun has extensive experience in the life sciences industry ranging from R&D, sales, marketing, and business development and management consulting. He brings a rich combination of strategic insight, practical business acumen and superior analytic skills to Verispan and Prism. Before joining Prism, Jun was a consultant at IMS Health Management Consulting Group, where he delivered more than 20 consulting engagements in the area of portfolio planning, market/product potential assessment, licensing, sales and marketing for clients ranging from investment firms, biotech companies to top pharmaceutical companies. Prior to IMS, he worked at AstraZeneca LLP where he was a business assessment manager. In this role he was responsible for evaluating the market potential and business opportunities for a $2 billion mature brand portfolio. His analytic work was the foundation for multiple licensing initiatives and he developed an innovative segmentation and targeting tool which was used by multiple brands to improve sales and marketing efficiency and accuracy. Prior to his business career, Jun worked as a postdoctoral fellow at Harvard Medical School. His research focused on the area of atherosclerosis and restenosis. Jun earned his PhD in Biology from Bowling Green State University, M.S. from The Chinese University of Hong Kong and a B.S. in Biology from ZhongShan University, China. Mr. Huangpu also obtained his MBA from Harvard Business School.

Jun's e-mail address is jhuangpu@prismpharma.com.

B2 - Business Session 2: US Pharmaceutical Markets

How to market an international brand in North America OTC market

Dahai Guo, MBA

Director of Marketing
Inverness Medical Nutritionals Group, Freehold, NJ

BIOGRAPHY

Mr. Dahai Guo currently is the Director of Marketing at Inverness Medical, a leading multinational company in medical diagnostic & nutritional products. Through his professional career, Mr. Guo has held senior positions in several multi-billion dollar global companies. Mr. Guo has broad experience from biotechnology research, product development, global strategic planning, sales & marketing. He has demonstrated strong leadership in successfully marketing global consumer brands over 70 different countries, including major retail markets like US, Canada, West Europe Australia and China markets. Particularly, his strong marketing expertise has covered every sales channel in US retail (Food/Drug/Mass/e-commerce/C-stores), hospital and industrial markets. Mr. Guo has given speeches at many national and international conferences.

Before he came to US in 1995, Mr. Guo conducted molecular biology research at China's top research institute, Chinese Academy of Sciences, in Beijing. He has MBA from Cornell University and M.S. of Biology from Rutgers University. He is also a distinguish Six-Sigma Black Belt awarded from America Society for Quality.

Mr. Dahai Guo's speech, "How To Market an International Brand In North America OTC Market" will focus on the branding strategy and marketing execution in US and Canada consumer market. This speech will share with you the hands-on skills to introduce a new healthcare product and new consumer brand in US retail market.

B2 - Business Session 2: US Pharmaceutical Markets

Kai Li, PhD, MBA

Associate Director
Pharmaceutical Marketing Division
Johnson& Johnson
Kai2005li@gmail.com or phone 215-514-4191 (cell)

BIOGRAPHY

Kai Li is the Associate Director of Worldwide Strategic Marketing in Biotech/Immunology/Oncology Franchise at Johnson & Johnson. Currently at J&J, Kai is responsible for commercial activities for two key oncology pipeline compounds. Kai has also been leading strategy development and L&A in oncology and supportive care at J&J.

Kai has 8-year experiences in biotech and pharmaceutical industry and has held a number of leadership positions. From 96-98, Kai served as Vice President of Technology and External Relationship in Viridis, a biotech startup, where he co-invented the technology to bio-synthesize Tamiflu™, leading to worldwide adoption to treat Asia Bird Flu. Kai also led the efforts to seek funding for the startup and was responsible for initial $2 MM Angel investment. After his Ph.D., he headed a research group in Dow's biotechnology division at San Diego, where he was responsible for 4 patents. Kai also served as a manager in New Business Development and was responsible for L&A at Dow Biotechnology. Since 2005, Kai joined J&J, where he serves as global marketing leader for two biologic drugs and is responsible for market and brand development. Kai is the first author of 7 scientific publications and one book chapter.

Kai received an MBA in Marketing and Finance from the Wharton School in 2005, a Ph.D. in Organic Chemistry and Biochemistry from Michigan State University in 1999, and a BS in Chemistry from Peking University in 1994.

Kai can be contacted by email: Kai2005li@gmail.com or phone 215-514-4191 (cell)

Day 2

University Leader's Forum (Panel)

Responsibilities of Research University in the 21st Century Flat World

Forum Chair

Da Hsuan Feng

Special Assistant to the President for Global Strategies and International Relations
Former Vice President for Research and Economic Development and
Professor of Physics
The University of Texas at Dallas
fengd@utdallas.edu

BIOGRAPHY

Da Hsuan Feng received his Physics Ph.D. from University of Minnesota and became M. Russell Wehr Distinguished Chair Professor of Physics at Drexel University. He also held the position of Vice President of Science Applications International Corporation, a Fortune 500 company. In 1996, "for (his) outstanding contributions to the understanding of nuclear structure physics, particularly for the applications of the coherent states to physics and nuclear physics," Feng received the accolade Fellow of the American Physical Society. He is the honorary professor of eleven Chinese universities which included Peking Union Medical College. Feng consulted for three National Laboratories, Los Alamos, Oak Ridge and Brookhaven and UK's Daresbury Laboratory and was the special advisor Korean American Science and Technology Network. He serves on numerous corporate Boards.

University Leader's Forum

Fujia Yang

Chancellor, University of Nottingham and
Former President of Fudan University, China
fjyang23@yahoo.com

BIOGRAPHY

Professor Fujia Yang, academician of the Chinese Academy of Sciences, is an internationally renowned nuclear physicist who currently serves as the sixth Chancellor of the University of Nottingham, one of the United Kingdom's leading research universities, and the Vice Chairman of the Chinese Association for Science & Technology.

Born in Shanghai, Professor Yang graduated from Fudan University in 1958 with a degree in physics. He went from his initial appointment as a Teaching Assistant, to a Professorial Chair in Physics, to the Presidency of the University of Fudan from 1993-1999. He served as Director of the Shanghai Institute of Nuclear Research of the Chinese Academy of Sciences from 1987-2001, was Chairman of the Shanghai Science and Technology Association from 1992-1996 and was the founding president of the Association of University Presidents of China from 1997 to 1999.

Dr. Yang's work has taken him to positions around the globe, including visiting professorships at the Neils Bohr Institute in Copenhagen, Denmark; State University of New York at Stony Brook, USA; Rutgers University, New Jersey, USA; and Tokyo University, Japan.

Professor Yang served as a council member representing China on the Association of East Asia Research Universities, was a member of the International Association of University Presidents and of the Association of University Presidents of the Pacific Rim. He holds honorary degrees from Soka University, Tokyo, Japan; the State University of New York; the University of Hong Kong; the University of Nottingham; and the University of Connecticut.

University Leader's Forum

Way Kuo

University Distinguished Professor & Dean of Engineering
124 Perkins Hall
Knoxville, TN 37996-2000
Phone: (865) 974-5321
Fax: (865) 974-8890
E-mail: way@utk.edu

BIOGRAPHY

Way Kuo received his B.S. degree in 1972 in Nuclear Engineering from National Tsing Hua University, and the Ph.D. degree in 1980 in Engineering from Kansas State University. Kuo is the Dean of Engineering and University Distinguished Professor at the University of Tennessee, and he is on the management team of Oak Ridge National Laboratory.

Kuo is an elected member of the US National Academy of Engineering and Academia Sinica of Taiwan. His area of expertise is reliability design and optimization. He has published five books and he currently serves as the Editor-in-Chief of IEEE Transactions on Reliability.

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University Leader's Forum

Leonard C. Feldman

Vanderbilt University, Department of Physics & Astronomy
Box 1807-B, Nashville, TN 37235
(615)-343-7273-(Office)
(615)-343-1708-(FAX)
e-mail: Leonard.C.Feldman@Vanderbilt.edu

BIOGRAPHY

EDUCATION:

B.A. (Physics) - Drew University - 1961
M.S. (Physics) - Rutgers, The State University - 1963
Ph.D. (Physics) - Rutgers, The State University - 1967

EMPLOYMENT:

Rutgers, The State University, 2007-

- *Vice President, Physical Sciences and Engineering Partnerships, 2007-*
- *Director, Institute for Advanced Materials, Devices and Nanotechnology, 2007-*
- *Professor of Physics and Astronomy, 2007-*
- *Professor of Materials Science and Engineering, 2007*

Department of Physics and Astronomy, Vanderbilt University, Nashville, TN 37235

- *-Stevenson Professor of Physics, 1996-*
- *-Professor of Materials Science and Engineering 2003-*
- *-Co-Director, NSF-Interdisciplinary Graduate Program in Materials Science 1999-*
- *-Director, Vanderbilt Institute of Nano-scale Science and Engineering 2001-*
- *-co –appointments, Fisk Univ., ORNL, Rutgers Univ.*

Distinguished Visiting Scientist, Oak Ridge National Laboratory, Knoxville, TN

- *Solid State Division, 1996-*

AT&T Bell Laboratories, 1967 - 1996

- *Department Head:* Silicon Materials Research Department, 1990 - 1996
- Silicon Electronics Research Laboratory (R. E. Howard, Director)
- *Department Head:* Thin Film Semiconductor Research Department, 1987-1990

- Materials Processing Laboratory, (A.Y. Cho, Director)
- *Department Head:* Materials Interfaces and Ceramics Res. Department, 1984-1987

Materials Science Laboratory, (G.Y. Chin, Director)

- *Supervisor:* Materials Interface Characterization Group, 1983-1984

Physical Metallurgy and Ceramics Research Department, (G. Y. Chin, Dept. Head)

- *Member of Technical Staff*: 1967-1983
  Radiation Physics Department, (W. L. Brown, Dept. Head)

PUBLICATIONS: (over 360 total publications, 3 books, 15 edited chapters, 22 patents)
Books:
"Materials Analysis by Ion Channeling," L.C. Feldman, J.W. Mayer and S.T. Picraux, Academic Press, N.Y. (1982).
"Fundamentals of Surface and Thin Film Analysis," L.C. Feldman and J.W. Mayer, North Holland-Elsevier, N.Y. (1986); translated into Japanese, Kaibundo Publishing (1988); translated into Russian, MIR Publishing (1989)
"Electronic Materials Thin Film Science," K. Tu, J.W. Mayer and L.C. Feldman, Macmillan Publ. N.Y. (1992).

SYNERGISTIC ACTIVITES:

Director Vanderbilt/Fisk IGERT program in the Nanosciences
Councilor American Physics Society
Amer. Phys. Soc Task Force-Physics and Counterterrorism (2002-2003)
Initiator and Director of the Vanderbilt Institute of Nanoscale Science and Engineering, involving new course creation and broad faculty participation;
Chair, Division of Materials Physics, Amer. Phys Soc (2001-2002);
Establishment of ion beam/analytical facility; multi-user facility at Vanderbilt Univ;
Editorial Advisory Board-International Journal of Nanoscience (2001-), Surface Science Reports (1986-), Applied Surface Science(1985-96), J. of Materials Research (1989-94), J.V.S.T. (1996-99);
Fisk University (HCBU)-Dir. Joint Grad Program in Materials Science

HONORS & AWARDS:

Fellow American Association for Advanced Science
David Adler Lectureship Award, Amer. Phys. Soc. - 1999
Royal Danish Academy of Sciences and Letters (elected 1994)
Fellow of American Physical Society
Fellow of American Vacuum Society
Distinguished Member of Technical Staff - AT&T Bell Labs
Chairperson, Gordon Conference on Particle - Solid Interactions - 1978
Chairperson, Gordon Conference on Defects in Semiconductors - 1996
Distinguished Visiting Scientist, Oak Ridge National Laboratory, 1996-
Listed: 1000 Most Cited Physicists (1981-1997) (Out of 500,000)
Drew University Alumni Achievement Award in Science (1996)

University Leader's Forum

Michael Ming-Chiao Lai, M.D., Ph.D.

President, National Cheng Kung University
Tainan, Taiwan, R.O.C.
Tel: 886-6-2757575 ext.50000
FAX: 886-6-2743981
E-Mail: michlai@email.ncku.edu.tw

BIOGRAPHY

Birth date
September 8, 1942

Education

1968	M.D.	Medicine	National Taiwan University College of Medicine, Taiwan, Republic of China
1973	Ph.D.	Molecular Biology	University of California, Berkeley, California
1973	Postdoctoral	Molecular Biology	University of California, Berkeley, California

Academic Appointments

2003-2006	Distinguished Research Fellow and Vice President, Academia Sinica
2002-2007	Distinguished Professor, University of Southern California
1990-2003	Investigator, Howard Hughes Medical Institute
1988	Visiting Professor, Institute of Molecular Biology, Academia Sinica, Taipei, Taiwan
1983-2002	Professor, Department of Molecular Microbiology and Immunology (formerly Microbiology) and Department of Neurology, University of Southern California, Keck School of Medicine, Los Angeles, California
1981-1983	Associate Professor, Department of Neurology, University of Southern California School of Medicine, Los Angeles, California
1978-1983	Associate Professor, Department of Microbiology, University of Southern California School of Medicine, Los Angeles, California
1973-1978	Assistant Professor, Department of Microbiology, University of Southern C California School of Medicine, Los Angeles, California

Awards

1968 M.D., Summa cum Laude, National Taiwan University College of Medicine, Taiwan
1985 USC Phi Kappa Phi Award for Scientific Work, Honorable Mention
1986 International Scientist Fellowship from Japan Society for the Promotion of Science
1987, 1994 American Society for Microbiology Foundation Lecturer
1987 National Multiple Sclerosis Society Established Investigator
1989 Burlington Northern Foundation Faculty Achievement Award for Outstanding Scholar
1990 Howard Hughes Medical Institute Investigator Award
1990 American Society for Microbiology, RNA Virus Divisional Lecturer
1990 Society of Chinese Bioscientists in America, Cathay Hospital Award on Hepatitis Research
1992 Academician, Academia Sinica (National Academy of Sciences), Taiwan
1994-95 American Society for Microbiology, Foundation Lecturer
1995 USC School of Medicine Excellence in Teaching Award, Class of 1997
1995 Outstanding Alumnus Award (Inaugural), Tainan First High School, Taiwan
1996 Chinese-American Faculty Association of Southern California, Achievement Award
1997 Phi Tau Phi Scholastic Honor Society of America
1998 USC Associates Award for Creativity in Research and Scholarship
2001 Distinguished Professor, University of Southern California
2001 "Highly Cited Researcher", Institute of Scientific Information
2002 Hastings Foundation Professor, University of Southern California
2002 Fellow, American Academy of Microbiology
2003 Taiwanese-American Foundation Science-Technology Award
2004 Doctor Honoris Causa, The Central University, Taiwan
2004 "Highly Cited Researcher" (1981-2000), Institute of Scientific Information
2006 TWAS Fellow, The Academy of Sciences for the Developing World

Publications (The past 3 years)

1. Kawamura H, Govindarajan S, Aswad F, Machida K, Lai MM, Sung VM, Dennert G. (2006) HCV core expression in hepatocytes protects against autoimmune liver injury and promotes liver regeneration in mice. Hepatology. 44, 936-44.
2. Macnaughton TB, Lai MM. (2006) HDV RNA replication: ancient relic or primer? Curr Top Microbiol Immunol. 307, 25-45. Review.
3. Machida K, Cheng KT, Lai CK, Jeng KS, Sung VM, Lai MM. (2006) Hepatitis C virus triggers mitochondrial permeability transition with production of reactive oxygen species, leading to DNA damage and STAT3 activation. J Virol. 80, 7199-207.
4. Li YJ, Macnaughton T, Gao L, Lai MM. (2006) RNA-templated replication of hepatitis delta virus: genomic and antigenomic RNAs associate with different nuclear bodies. J Virol. 80, 6478-86.
5. Yu GY, Lee KJ, Gao L, Lai MM. (2006) Palmitoylation and polymerization of hepatitis C virus NS4B protein. J Virol. 80, 6013-23.
6. Choi SH, Park KJ, Ahn BY, Jung G, Lai MM, Hwang SB. (2006) Hepatitis C virus nonstructural 5B protein regulates tumor necrosis factor alpha signaling through effects on cellular IkappaB kinase. Mol Cell Biol. 26, 3048-59.
7. Lee J, Wu CC, Lee KJ, Chuang TH, Katakura K, Liu YT, Chan M, Tawatao R, Chung M, Shen C, Cottam HB, Lai MM, Raz E, Carson DA. (2006) Activation of anti-hepatitis C virus responses via Toll-like receptor 7. Proc Natl Acad Sci U S A. 103, 1828-33.
8. Machida K, Cheng KT, Sung VM, Levine AM, Foung S, Lai MM. (2006) Hepatitis C virus induces toll-like receptor 4 expression, leading to enhanced production of beta interferon and interleukin-6. J Virol. 80, 866-74.
9. Lai MM. (2005) RNA replication without RNA-dependent RNA polymerase: surprises from hepatitis delta virus. J Virol. 79, 7951-8. Review.
10. Hamamoto I, Nishimura Y, Okamoto T, Aizaki H, Liu M, Mori Y, Abe T, Suzuki T, Lai MM, Miyamura T, Moriishi K, Matsuura Y. (2005) Human VAP-B is involved in hepatitis C virus replication through interaction with NS5A and NS5B. J Virol. 79, 13473-82.

11. Choi KS, Aizaki H, Lai MM. (2005) Murine coronavirus requires lipid rafts for virus entry and cell-cell fusion but not for virus release. J Virol.79, 9862-71.
12. Machida K, Cheng KT, Pavio N, Sung VM, Lai MM. (2005) Hepatitis C virus E2-CD81 interaction induces hypermutation of the immunoglobulin gene in B cells. J Virol. 79, 8079-89.
13. Shi S.T., Lai M.M.C. (2005) Viral and cellular proteins involved in coronavirus replication. Curr. To.p Microbiol. Immunol. 287, 95-131. Review.
14. Yu G.Y., Lai M.M.C. (2005) The ubiquitin-proteasome system facilitates the transfer of murine coronavirus from endosome to cytoplasm during virus entry. J. Virol. 79, 644-648.
15. Lai, M.M.C. (2005) RNA replication without RNA-dependent RNA polymerase: Surprises from hepatitis delta virus. J. Virol. (minireview) 79, 7951-7958.
16. Choi K.S., Mizutani A., Lai M.M.C. (2004) SYNCRIP, a member of the heterogeneous nuclear ribonucleoprotein family, is involved in mouse hepatitis virus RNA synthesis. J. Virol. 78, 13153-13162.
17. Vo N.V., Tuler J.R., Lai M.M.C. (2004) Enzymatic characterization of the full-length and C-terminally truncated hepatitis C virus RNA polymerases: function of the last 21 amino acids of the C terminus in template binding and RNA synthesis. Biochemistry 43, 10579-10591.
18. Machida K., Cheng K.T., Sung V.M., Lee K.J., Levine A.M., Lai M.M.C. (2004) Hepatitis C virus infection activates the immunologic (type II) isoform of nitric oxide synthase and thereby enhances DNA damage and mutations of cellular genes. J. Virol. 78, 8835-8843.
19. Aizaki H., Lee K.J., Sung V.M., Ishiko H., Lai M.M.C. (2004) Characterization of the hepatitis C virus RNA replication complex associated with lipid rafts. Virology 324, 450-461.
20. Lee K.J., Choi J., Ou J.H., Lai M.M.C. (2004) Interactions between viral nonstructural proteins and host protein hVAP-33 mediate the formation of hepatitis C virus RNA replication complex on lipid raft. J Virol. 78, 3480-3488.
21. Machida K., Cheng K.T., Sung V.M., Shimodaira S., Lindsay K.L., Levine A.M., Lai M.Y., Lai M.M.C. (2004) Hepatitis C virus induces a mutator phenotype: enhanced mutations of immunoglobulin and protooncogenes. Proc. Natl. Acad. Sci. U S A 101, 4262-4267.
22. Li Y.J., Stallcup M.R., Lai M.M.C. (2004) Hepatitis delta virus antigen is methylated at arginine residues, and methylation regulates subcellular localization and RNA replication. J Virol. 78, 13325-13334.

University Leader's Forum

James Wei

Professor of Chemical Engineering
Pomeroy and Betty Perry Smith Professor of Engineering
Emeritus Dean of Engineering and Applied Science
Princeton University
E-mail: *jameswei@princeton.edu*

BIOGRAPHY

B.S., Georgia Institute of Technology, 1952
M.S., Massachusetts Institute of Technology, 1954
Sc.D., Massachusetts Institute of Technology, 1955

Honors and Awards

- Founders Award, American Institute of Chemical Engineers, 1990
- Warren K. Lewis Award, American Institute of Chemical Engineers, 1985
- American Academy of Arts and Sciences, 1982
- Academia Sinica, 1982
- William H. Walker Award, American Institute of Chemical Engineers, 1980
- National Academy of Engineering, 1978
- Professional Progress Award, American Institute of Chemical Engineers, 1970
- Petroleum Chemistry Award, American Chemical Society, 1966

T11 – Technical Session 11: Nanotechnology (III)

On the Accuracy of the Spring Constant of Atomic Force Microscopy Cantilevers

Meng-Kao Yeh, Nyan-Hwa Tai and Bo-Yi Chen

Department of Power Mechanical Engineering
Department of Materials Science and Engineering,
National Tsing Hua University, Hsinchu 30013 Taiwan, R.O.C.
Email: mailto:mkyeh@pme.nthu.edu.tw

ABSTRACT

Atomic force microscopy (AFM) is widely used in many fields, because of its outstanding force measurement ability in nano-scale. In order to have accurate results, AFM cantilevers must be calibrated precisely before use. The AFM cantilever's spring constant is usually provided by the manufacturer, and it is calculated from simple equations or some other calibration methods. The spring constant may have some uncertainty which may cause large errors in force measurement. The finite element analysis was used to obtain the deformation behavior of the AFM cantilever and to calculate its spring constant. The variations of Young's modulus, Poisson's ratio, cantilever geometries, tilt angle, coating layer and the influence of image tip mass were evaluated to find their effects on the cantilever's characteristics. The influence of pre-stress, ignored by other methods, is also discussed. The results were compared with those obtained from other methods. After taking the above parameters into consideration, the more accurate force measurements by AFM cantilever can be obtained.

BIOGRAPHY

Dr. Meng-Kao Yeh received his BS and MS from National Tsing Hua University, Taiwan and his Ph.D. in Aerospace Engineering and Engineering Mechanics from the University of Texas at Austin, USA. Dr. Yeh is currently a professor of the Department of Power Mechanical Engineering and the Director of the Mid-north Region K-12 Education Center for Nanotechnology at the National Tsing Hua University (NTHU). His research interests include Mechanics of Composite Materials, Nanocomposites, Structural Stability, and Mechanics of Electronic Packaging. His recent research topics include: (a)Dynamic Instability Analysis and Experiment of Composite Structures; (b)Spring Constant of AFM Cantilever; (c)Mechanical Properties of MWNTs/polymer Nanocomposite Materials; and (d)Thermal Analysis and Optimization of LED package. He has published more than 100 journal/conference papers and has been a reviewer of several technical journals. He is a member of the following professional

societies: ASME, AIAA, SEM, in USA and Society of Theoretical and Applied Mechanics (Taiwan), the Chinese Society of Mechanical Engineers (Taiwan).

T11 - Technical Session 11: Nanotechnology (III)

Synthesis of Metal Nano-Particles Using Electron Beam Reduction for Proton Exchange Membrane Fuel Cells

Frank Fuh-Sheng Shieu

Professor, Department of Materials Science and Engineering Dean, Office of Research and Development National Chung Hsing University Tel: +886-4-2285-4563, Fax: +886-4-2285-7017 E-mail: fsshieu@dragon.nchu.edu.tw

ABSTRACT

A novel method of preparing electrocatalytic particles for proton exchange membrane fuel cells (PEMFCs) is presented. The method utilizes the idea of reducing metal ions of the catalyst species right on the carbon cloth fibers and the multi-walled carbon nano-tubes (MWNTs) via direct electron-beam bombardment. Electron microscopy shows that the morphology of the electron-beam reduced catalyst particles were dispersed in an equal and homogeneous manner within the MWNTs/carbon cloth electrode carriers, implying that the electroactive surface area of the electron-beam reduced catalysts should assume a larger value than those from currently reported methods. With the Pt (catalyst) loading being controlled, data obtained from electrochemical and polarization tests show that the electrodes and membrane electrode assemblies (MEA) prepared from the electron-beam reduction have larger active surface areas and better working performance than those prepared from the sputtering method.

BIOGRAPHY

Frank F. S. Shieu received his B. S. in Materials Science & Engineering from National Tsing Hua University, Taiwan, in 1981 and his Ph. D. in Materials Science & Engineering from Cornell University in 1990. Before studying at Cornell University, he served in China Marine Corp as a second lieutenant for two years and then worked for China Steel Co. as a product engineer for another two years. He joined the Analytical Laboratory of the Dow Chemical Co. at Midland, Michigan, in 1990. Three years later, in 1993 he returned to Taiwan and joined the newly founded Institute of Materials Engineering at National Chung Hsing University, Taichung. In his term as a director, Frank Shieu set up its undergraduate program for the institute in 2000, which then became the Department of Materials Science & Engineering. As a result of his enthusiasm and outstanding academic performance, he was appointed as the Dean of Research & Development at Chung Hsing University in 2003. The University was

selected by the Ministry of Education in 2006 as one of the top 12 premier research-oriented university in Taiwan.

Frank Shieu's research interests include thin films & coating technology, nanomaterials and nanotechnology, electron microscopy and nanocharacterization, and functional materials with emphasis on transparent conducting oxides and membrane electrode assembly for fuel cells. In recognition of his contribution to the society, he was elected as the President of Taiwan Association for Thin Films & Coating Technology in 2005. In addition, he is actively involved in promoting the nanoscience and nanotechnology to the publics and students, and has served, since 2003, as the director for mid-south K-12 regional center of NHRD program, Advisory Office, Ministry of Education

T11 - Technical Session 11: Nanotechnology (III)

The Physical Property and Nano-structural Analyses on Oxide Nano-wires

Ji-Jung Kai

Professor, Department of Engineering and System Science National Tsing Hua University Hsinchu, TAIWAN, 300, R.O.C. Tel:+886-3-5734280, FAX: +886-3-5734066 E-mail: jjkai@ess.nthu.edu.tw

ABSTRACT

The electrical and magnetic properties of a single oxide nano-wire were studied by using both traditional four-point measurement and newly developed TEM-STM two-point measurement techniques. Two kinds of conducting oxide nanowires (RuO2 and ITO), semiconductor nanowire (ZnO) and dilute magnetic semiconductor (DMS) nanowire (Zn(1-x)Co(x)O) were studied. It is observed that the quality of nanocontact is vital to the correct measurement of the electrical resistance of the conducting nanowires. Different cross-sectional shape modulation of physical properties in ZnO and Zn(1-x)Co(x)O nanowires were studied. We found that the cylindrical and hexagonal shape effect can modulate structural, electrical, optical, and even magnetic properties in these nanowires. Direct observation of structural defects on ferromagnetism in (Zn(1-x)Co(x)O) nanowires indicates that the occurrence of ferromagnetism in dilute magnetic semiconductor (DMS) nanowires is heavily related to the defect structure. The microstructural analyses were done by using field emission scanning electron microscopy (FESEM) and high resolution transmission electron microscopy (HRTEM) with X-ray energy dispersive spectroscopy (XEDS) and electron energy loss spectroscopy (EELS).

BIOGRAPHY

Ji-Jung Kai received his B.S. degree in Nuclear Engineering from National Tsing Hua University, Hsinchu TAIWAN in 1978 and his M.S. and Ph.D. degrees in Nuclear Engineering from University of Wisconsin-Madison in 1986. He then joined National Tsing Hua University as an associate professor and was promoted to full professor in 1990. He was the head of the Reactor Division of the Nuclear Science and Technology Development Center from 1991 to 1995 and became the director of the center from 1995 to 1997. He also served as the

Chairman of the Department of Engineering and System Science from 2004 to 2007. He was the vice president of the Taiwan Microscopy Society from 2002 to 2004 and became the president of the Society from 2004 to 2006. Currently, he is a full professor in the Department of Engineering and System Science in the National Tsing Hua University.

Ji-Jung Kai's current research interests include electron microscopy in nano-materials, radiation effects in high temperature nuclear structural materials, and applications of oxide nano-wires in electro-optical devices including dye-sensitized solar cell , electrochromism device, and dilute magnetic semiconductor for spintronics application. His research activities have been supported by National Science Council, Atomic Energy Council, Taipower Company Ltd., Institute of Nuclear Energy, Industrial Technology Research Institute, Ministry of Education, and many industrial companies. He has authores and coauthored over 150 reviewed scientific papers, a few patents and many conference proceedings.

T11 - Technical Session 11: Nanotechnology (III)

Functional Nanomaterials for Theranostic Applications

Dar-Bin Shieh

Associate Professor, Institute of Oral Medicine and Institute of Basic Medical Sciences Center for Micro/Nano Science and Technology National Cheng Kung University Tainan, Taiwan, 70101, ROC Tel: (886-6) 2353535 ext. 5410 Fax: (886-6) 2766626 E-mail: dshieh@mail.ncku.edu.tw

ABSTRACT

Nanoparticles presented distinct physical properties for advanced biomedical applications. We demonstrated the use of targeting nanoparticles for combined molecular diagnostic imaging and in situ targeted therapy – the theranostic applications in cancer using two different nanotechnology enabled modalities as examples. The photoacoustic imaging utilizing gold nanorod as tunable multi-labeled molecular imaging contrast agents was demonstrated both in vitro and in vivo using wild type and gene knock down cancer model. Combined tunable wavelength laser system and Au rod molecular probes with tunable surface plasmon resonance frequency, simultaneous molecular imaging of multiple gene products could be achieved. The same platform was switched to hyperthermia therapy to eradicate imaging confirmed cancer cells in situ upon increase in laser power. The second example demonstrated a novel concept of modularly designed magnetite nanoparticles with changeable targeting module and imaging contrast module for cancer molecular MR imaging. The porous magnetite nanoparticles for controlled drug releasing kinetics and subcellular targeting were also demonstrated using laser confocal imaging system.

BIOGRAPHY

Shieh is currently the Director of University Development in National Cheng Kung University. He is also an academic physician in charge the Oral Diagnosis and General Dentistry in NCKU Medical Center and an associate professor joint appointed by the Institute of Oral Medicine, the Institute of Basic Medical Sciences and the Institute of Micro Nano Science and Technology. Dr. Shieh graduate with D.D.S. degree from National Yang-Ming University in Taiwan, in 1988. He received his Doctor of Medical Sciences degree (D.M.Sc.) in Oral Biology and Certificate in Oral Diagnosis and Pathology from Harvard University in 1997 after resident doctor training in Taipei Veterans General Hospital. Dr. Shieh went back to Taiwan after 2 years post-doctor experience in Harvard Medical School and served as Assistant Professor and session chief in

Department of Dentistry in National Cheng Kung University Medical Center in 1999. He served as assistant director of Research and Education in the Center for Micro Nano Science and Technology between 2005 and 2007 to promote nano science in both higher education and K-12. His research interests include translational nanobiomedicine for new diagnostic/therapeutics approaches, the mitochondria medicine and biology, and cancer molecular genetics. Prof. Shieh is an active member in NCKU nanobiomedicine research teamwork under the support of National Nano Science and Technology Program Project. He is also the team leader of a Taiwan (National Science Council and ITRI)-Canada (National Research Council) international collaboration research project in the molecular imaging of cancers enabled by nanotechnology. His research in cancer motility factors was recently honored the Best Basic Science Award in the 1st ICOOC congress in 2005. He is an IEEE technical committee member on nano biomedicine and has served as reviewer of several medical and material science journals. He is a member of the following professional societies: IAOO, IADR, IEEE and Executive Committee Member of the Taiwan Society of Mitochondria Research and Medicine and the founder member of the Taiwan Society of Quantum Science and Technology.

Selected Publications:

1. Shieh DB, Chen CC, Shih TS, Tai HM, Wei YH, Chang HY. Mitochondrial DNA alterations in blood of the humans exposed to N,N-Dimethylformamide. Chemico-Biological Interactions, 2007 Feb; 165(3): 211-219. (SCI)
2. Wu PC, Wang WS, Huang YT, Shen HS, Lo YW, Tsai TL, Shieh DB*, Yeh CS. Porous Iron Oxide-Based Nanorods Developed as Delivery Nanocapsules. Accepted by Chemistry-A European Journal. (SCI)
3. Su CH, Sheu HS, Lin CY, Huang CC, Lo YW, Pu YC, Weng JC, Shieh DB, Chen JH, Yeh CS. Nanoshell Magnetic Resonance Imaging Contrast Agents. Accepted by Journal of the American Chemical Society.
4. Shieh DB*, Su CH, Chang FY, Wu YN, Su WC, Hwu JR, Chen JH, Yeh CS. Aqueous nickelnitrilotriacetate modified Fe3O4–NH3+ nanoparticles for protein purification and cell targeting. Nanotechnology, 2006 Aug; 17(16):4174-4182. (SCI)
5. Yang WH, Lee CF, Tang HY, Shieh DB, Yeh CS. Iron Oxide Nanopropellers Prepared by a Low-Temperature Solution Approach. J. of Physical Chemistry B, 2006 Jul; 110(29), 14087-14091.(SCI)
6. Shieh DB, Chen IW, Shiao CY, Wei CY, Chung CH, Chang HJ, Jin YT, Wong, TY. Tissue expression of gelsolin in oral carcinogenesis progression and its clinicopathological implications. Oral Oncology, 2006 Jul; 42(6):599-606. (SCI)
7. Tai SP, Lee WJ, Shieh DB, Wu PC, Huang HY, Yu CH, Sun CK. In vivo optical biopsy of hamster oral cavity with epi-third-harmonic-generation microscopy, Optics Express, 2006 Jun; 14(13), 6178-6187. (SCI)
8. Hsiao MT, Chen SF, Shieh DB*, Yeh CS. One-Pot Synthesis of Hollow Au3Cu1 Spherical-Like and Biomineral Botallackite Cu2(OH)3Cl Flower- Like Architectures Exhibiting Anti-microbial Activity. J. of Physical Chemistry B, 2006 Jan; 110(1), 205-210.(SCI)
9. Huang CC, Hwa JR, Su WC, Shieh DB, Tzeng YH, Yeh CS. Surfactant- Assisted Hollowing of Cu Nanopaticles Incorporating with Halide-Induced Corrosion Oxidation. Chemistry-A European Journal, 2006 May, 12(14), 3805-3810. (SCI)
10. Lu J, Yang S, Ng KM, Su CH, Yeh CS, Wu YN, Shieh DB. Solid-state synthesis of monocrystalline iron oxide nanoparticles (MIONs) ferrofluid for application as MRI contrast agent. Nanotechnology, 2006 Dec; 17(23):5812-5820.(SCI)
11. Pu YC, Hwa JR, Su WC, Shieh DB, Tzeng YH, Yeh CS. Water Dissolvable Sodium Sulfate Nanowires as a Versatile Template for the Synthesis of Polyelectrolyte and Metal-based Nanotubes. Journal of the American Chemical Society, 2006 Sep, 128(35), 11601-11611. (SCI)

12. Shieh DB, Yang SR, Shi XY, Wu YN, Wu SN. Properties of BKca Channels in Oral Keratinocytes. Journal of Dental Research, 2005 May; 84(5):468-473. (SCI)
13. Shieh DB*, Chang FY, Su CH, Yeh CS, Wu MT, Tsai CY, Wu CL, Chen DH, Chou CH. Aqueous Dispersions of Magnetite Nanoparticles with NH3+-surfaces for magnetic manipulations of biomocules and MRI contrast agents. Biomaterials, 2005 Dec, 26(34), 7183-7191. (SCI)
14. Chang FY, Su CH, Yang YS, Yeh CS, Tsai CY, Wu CL, Wu MT, Shieh DB*. Characterization of a newly synthesized Fe3O4 nanoparticle aqueous dispersions and its biomedical applications. Biomaterials, 2005 Mar; 26: 729-738. (SCI)
15. Tai SP, Tsai TH, Lee WJ, Shieh DB, Liao YH, Huang HY, Zhang KYJ, Liu HL, Sun CK, "Optical biopsy of fixed human skin with backward-collected optical harmonics signals," Optics Express, 2005 Oct;13, 8231-8242. (SCI)
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T12 - Technical Session 12: Bioinformatics & Systems Biology (III)

Session Chair

Fang Liu

Resident Faculty Member, Center for Advanced Biotechnology and Medicine
Associate Professor, Department of Chemical Biology, Rutgers University
Member, Cancer Institute of New Jersey
Tel: 732-235-5372
Fax: 732-235-4850
Email: fangliu@cabm.rutgers.edu

BIOGRAPHY

Dr. Fang Liu obtained her B.S. in biochemistry from Beijing University in 1984 and Ph.D. in biochemistry from Harvard University in 1992 working with Dr. Michael R. Green. She conducted postdoctoral research with Dr. Joan Massagué at Memorial Sloan-Kettering Cancer Center and joined Rutgers Faculty in 1998. Dr. Liu has received awards from the American Association for Cancer Research-National Foundation for Cancer Research, the Pharmaceutical Research and Manufacturers of America Foundation, the Burroughs Wellcome Fund, and the Sidney Kimmel Foundation for Cancer Research. She also obtained fellowships from the K.C. Wong Education Foundation and the Jane Coffin Childs Memorial Fund for Medical Research. Dr. Liu studies TGF-beta/Smad signal transduction, transcriptional regulation, cell cycle control and their roles in tumorigenesis.

T12 - Technical Session 12: Bioinformatics & Systems Biology (III)

Development of a Normalization Algorithm for array Comparative Genomic Hybridization (aCGH)

Eric Y Chuang

Department of Electrical Engineering, Graduate Institute of Biomedical Electronics and Bioinformatics, Department of Life Science, and Graduate Institute of Epidemiology
National Taiwan University
Taipei, Taiwan

Tel: 886-2-3366-3660, Fax: 886-2-3322-4179
Email: chuangey@cc.ee.ntu.edu.tw

ABSTRACT

Genomic instability is one of fundamental factors in tumorigenesis and tumor progression. Many studies have shown that copy-number abnormalities at the DNA level are important in the pathogenesis of cancer. Array Comparative Genomic Hybridization (array CGH), developed based on expression microarray technology, can reveal the chromosomal aberrations in segmental copies at a high-resolution. However, due to the nature of array CGH, many standard expression data processing tools, such as data normalization, often failed to yield satisfactory results. We demonstrate a novel array CGH normalization algorithm, which provides an accurate array CGH data normalization by utilizing the dependency of neighboring probe measurements in array CGH experiments. To facilitate the study, we have developed a Hidden Markov Model (HMM) to simulate a series of array CGH experiments with random DNA copy number alterations that can be used to validate the performance of our normalization. In addition, we applied our algorithm to normalize real data from an array CGH study of CL1-0, CL1-1 and CL1-5 cell lines. CL1-0, CL1-1 and CL1-5 are closely related lung cancer cell lines which are classified according to their differential invasiveness. The normalization made significant improvement over data quality and enhanced the reliability of experimental results. By using this newly developed algorithm, the normalized data showed distinct patterns of DNA copy number alternations among those lung cancer cell lines.

T12 - Technical Session 12: Bioinformatics & Systems Biology (III)

Genomic Gain of 8q22 Activates Metadherin and Promotes Chemoresistant Metastasis of Poor-Prognosis Breast Cancer

Yibin Kang

Assistant Professor, Department of Molecular Biology
Princeton University
Princeton, NJ 08544
Tel: 669-258-8834, Fax:609-258-2340
Email: ykang@princeton.edu

ABSTRACT

Genes essential for driving the deadly march of metastatic cancer cells to distant organs are often hidden among numerous genetic alterations frequently found in advanced stage tumors. We designed and applied an innovative computational approach to identify recurrent genomic alterations associated with poor prognosis breast cancer. Genomic gain of 8q22 is linked to elevated expression of metastasis gene *metadherin* (MTDH) and poor clinical outcome of breast cancer patients. Functional analysis of MTDH revealed its dual role in promoting tumor cell adhesion to endothelial cell and enhancing chemoresistance. These findings suggest a novel approach to identify key mediators of metastasis through innovative analysis of expression profiling data and establish MTDH as an important therapeutic target for metastatic breast cancer.

BIOGRAPHY

Dr. Kang is a native of Fujian Province in Southern China. He was selected to an experimental science class in Beijing University High School at the age of 15 after wining the National Chemistry Competition in 1988. He received his bachelor's degree from the Department of Genetics at Fudan University in Shanghai in 1995. As a graduate student at Duke University, Dr. Kang studied the mechanism of retroviral gene regulation and cellular mRNA export with renowned virologist Bryan Cullen. After completing his graduate study at Duke in just four years and with 11 publications, Dr. Kang joined the Memorial Sloan-Kettering Cancer Center as a postdoctoral fellow with Dr. Joan Massagué in 2000. He conducted ground-breaking research on TGFβ signal transduction and functional genomic analysis of breast cancer tissue-specific metastasis. During Dr. Kang's pre- and post-doctoral research career, he published over 20 original articles in leading journals such as *Cell*, *Molecular Cell*, *Cancer Cell* and *Genes & Development*.

Dr. Kang joined the faculty of Princeton University as an Assistant Professor of Molecular Biology in the fall of 2004. Dr. Kang's research focuses on the molecular mechanisms of breast cancer metastasis, which is responsible for the large majority of cancer deaths. Dr. Kang's laboratory applies a multidisciplinary approach to analyze the molecular basis of cancer metastasis, combining molecular biology and genomics tools with animal models and advanced *in vivo* imaging technologies.

Dr. Kang's exceptional achievements have been recognized by many prestigious awards, including an American Cancer Society Scholar Award. He was one of the five recipients of the 2006 Department of Defense Era of Hope Scholar Award, intended for exceptionally talented, early-career scientists who have demonstrated that they are the best and brightest in their field through exceptional creativity, vision, and productivity.

T12 - Technical Session 12: Bioinformatics & System Biology (III)

Technologies for Understanding How We Get Cancer and Why It Has Been So Difficult to Cure

Carlo C. Maley

Assistant Professor, Systems Biology Division
Molecular and Cellular Oncology Program
The Wistar Institute
3601 Spruce St., Philadelphia, PA 19104
Tel: 215-495-6838, Fax: 215-495-6829
Email: cmaley@alum.mit.edu

ABSTRACT

The process by which normal tissue becomes cancerous is a process of cellular evolution within our bodies. Cells in tumors compete for resources and mutate in a microcosm of evolution. Cells with mutations that allow them to escape the body's natural defenses and proliferate faster than their competitors will tend to spread through a tumor. Eventually, this process can result in the evolution of malignancy: the invasion of neighboring organs. Unfortunately, most cancer therapies fail in late stage disease because they select for resistant mutants and patients relapse. Only recently have scientists begun to measure the evolution of cells in tumors. We have shown that measures of species diversity from ecology can be adapted to measure genetic diversity in tumors to predict those most likely to become malignant. New technologies are revealing complex ecosystems and genetic innovations within tumors. We are using computational simulations to develop new strategies for dealing with the evolution of resistance and harnessing the evolution of tumors for our own purposes.

BIOGRAPHY

Carlo C. Maley received his B.A. in computer science and psychology from Oberlin College in 1991, his M.Sc. in zoology from University of Oxford in 1993 and his Ph.D. in computer science from MIT in 1998. He carried out his postdoctoral training with Prof. Stephanie Forrest at the University of New Mexico and then Dr. Brian Reid at the Fred Hutchinson Cancer Research Center. He is currently an assistant professor at the Wistar Institute and a member of the Genomics and Computational Biology as well as the Cellular and Molecular Biology graduate programs at the University of Pennsylvania. He has served on the National Cancer

Institute's Translational Research Working Group round tables, the AACR Task Force for Cancer Prevention and has been an advisor to the National Commission on Digestive Diseases.

T12 - Technical Session 12: Bioinformatics & System Biology (III)

Upregulation of lymphocyte-associated genes marks a good prognosis subset of HER2+ breast cancers

Shridar Ganesan

Assistant Professor, Departments of Medicine and Pharmacology
The Cnncer Institute of New Jersey and the Robert Wood Johnson Medical School, UMDNJ
New Brunswick, NJ 08903
Tel: 732 235 5211, Fax: 732 235 5331
Email: ganesash@umndj.edu

ABSTRACT

Gene expression analysis has identified biologically relevant subclasses of breast cancer. However, most classification schemes do not robustly cluster all HER2+ breast cancers, in part due to limitations and bias of clustering techniques used. We propose an alternate approach which first separates the HER2+ tumors using a gene amplification signal for three or more of four Her2/neu amplicon genes and then applies consensus ensemble clustering separately to the HER2+ and HER2- clusters to look for further substructure. We applied this procedure to a microarray dataset of 286 early stage breast cancers and identified 2 Basal and 4 Luminal subtypes in the HER2- tumors, as well as two novel and robust HER2+ subtypes. HER2+ subtypes had median disease free survival of 99 months (95 % CI : 83-118 months) and 33 months (95 % CI: 11-54 months) respectively and asymptotic recurrence rates of 11 % and 58% respectively. The low recurrence subtype had a strong relative over-expression of lymphocyte-associated genes, and was also associated with a prominent lymphocytic infiltration on histological analysis. These data suggest that early stage HER2+ cancers associated with lymphocytic infiltration are a biologically distinct subtype with an improved natural history. This work is a collaboration with Alexe Gabriele of the Broad Institute, Gyan Bhanot of Rutgers University, and Lyndsay Harris of the Yale Cancer Center.

BIOGRAPHY

Shridar Ganesan received his A.B. in Chemistry from Princeton University in 1985 , and his M.D., and Ph.D. from Yale University in 1993. He complete his medical residency at the Brigham and Women's Hospital in Boston, MA, and his medical oncology fellowship at the Dana-Farber Cancer Institute in Boston, MA. He did post-doctoral research in the laboratory of David Livingston and joined the faculty at DFCI and Harvard Medical School in 2000. Shridar Ganesan then joined the faculty at the Cancer Institute of New Jersey and Robert Wood

Johnson Medical School, UMDNJ in 2005 where he is currently an Assistant Professor of Medicine and Pharmacology.

Shridar Ganesan's current research interests include identifying and characterizing biological pathways that are perturbed in clinically distinct subtypes of breast cancer. His research activities are sponsored by the NCI/NIH, the NJCCR, UMDNJ Foundation, Sidney Kimmel Foundation, and the Lehman Foundation.

B3 - Business Session 3: Start-Up Clinic

Session Chair

Samuel Wu, MD, PhD

Principal, SV Life Sciences
samuel.wu@svlsa.com

ABSTRACT

A critical task for an entrepreneur running a biotechnology company is raising the money – millions of dollars – to cover the costs of product development, including clinical trials. In this session, two early stage companies, one biopharmaceutical company and one medical device company, will present their business plans to a panel of healthcare venture capitalists (VCs). The participating VCs will represent a range of investing styles and strategies, from early to late stage investors, from small seed funds to large billion dollar firms. After each presentation, the VCs will offer constructive feedback on how the companies can make themselves more attractive to potential investors. The session should be educational not just for the presenting companies, but for all entrepreneurs thinking about seeking financing from VCs.

BIOGRAPHY

SV Life Sciences (SVLS) is an international venture capital firm that provides finance to businesses at all stages of development and across the human life sciences sector, ranging from biotechnology and pharmaceuticals to medical devices and instruments, to healthcare information technology and services. SVLS currently advises or manages five funds with capital commitments of approximately $1.6 billion investing primarily in North America and Europe.

Dr. Samuel Wu joined SVLS in 2002 and is focused on biotech and medical device investments. He is actively involved as a board observer at Alba Therapeutics, Logical Therapeutics, Sapphire Therapeutics, and Reshape Medical. Prior to joining SVLS, Samuel was an Engagement Manager with McKinsey and Company's Pharmaceuticals and Medical Products

practice, where he led teams of consultants serving clients on M&A, portfolio analysis and other strategic issues.

Samuel earned an MD and a PhD in Biochemistry from Stanford University and completed his internship in Internal Medicine at the University of California, Los Angeles. He holds an AB in Biochemistry from Harvard College.

B3 - Business Session 3: Start-Up Clinic

Rong (Ron) Liu, PhD, MBA

President and CEO, AustarPharma
Ron.liu@austarpharma.com

BIOGRAPHY

Ron has been in the pharmaceutical industry for 19 years, presently leading AustarPharma. Prior to his current role, Ron was employed at Bristol-Myers Squibb (BMS) as a Director of Global Product Development over five years. Ron has been responsible for pharmaceutical product development from exploratory development, preclinical, pre-formulation, drug delivery platform technologies, formulation, process, and scale up manufacturing toward commercialization. Ron has led many successful commercial launches, including projects that the R&D work was done in the US R&D center. The fruits of these projects were transferred to BMS's Chinese GMP facility in Shanghai for commercial manufacturing for the US market. In addition, Ron worked closely with marketing staff and frequently participated in the marketing activities. Through such activities, Ron received a sizeable amount of marketing experience. Ron also worked for Abbott Labs as a manager in product development, prior to BMS, where he has participated in several major commercial product developments, such as Lansoprazole (Prevacid) and Fenofibrate (Tricor). At Abbott, Ron has gained great experience in product life cycle management. Previous to Abbott, Ron worked for Wyeth (previously Cyanamid), where he contributed significantly from early development to full development. One of his key contributions was the development of Injectable Vertepofin Liposomes (Visudyne), one of the seven liposomal products approved by the FDA. Ron was the sole inventor of the patented liposomal technology for thus far the biggest (half billon dollar in sales) liposomal product in the world. During his years in the pharmaceutical industry, he has gained extensive experiences in drug delivery technologies and pharmaceutical dosage innovations. One aspect of his special expertise and research interests is water-insoluble drug delivery. He is the editor and author of the book Water-Insoluble Drug Formulation, published by CRC Press. Ron is an inventor for more than 15 issued and pending drug delivery technology and formulation patents. In addition, Ron has been a Grant Reviewer for NIH in Drug Delivery, Product Development and Manufacturing. Ron graduated with a PhD in

Pharmaceutics from the University of Iowa in 1991 and an MBA in Marketing from Rutgers University in 2002.

B3 - Business Session 3: Start-Up Clinic

David Wang, MD, MBA

Co-Founder and CEO, New York Orthopedics
wangdxy@yahoo.com

BIOGRAPHY

Dr. David Wang is Co-Founder and CEO of New York Orthopedics, Inc. (NYO), a Delaware incorporated company developing and marketing innovative orthopedic products for the exploding Chinese market and select other countries. David has been engaging a premier orthopedic hospital in US and three top orthopedic hospitals in China to develop implants that are anatomically conforming to the unique requirements of the Asian body. The innovative products will strongly differentiate NYO from its competitors. NYO has secured support in China on various fronts, including co-investment from Chinese investors. NYO will produce and distribute the innovative orthopedic implants in its primary market, China, and will export outside of China to selective markets. During 2005-2006, David was the Vice President of Business Development and Marketing of Tianjin Biochip Corporation, a biotech device and diagnostic company in Tianjin, China. David developed strategic initiatives on new product development. He developed strategic joint ventures with US medical device and diagnostic companies on co-developing and co-marketing innovative medical devices and diagnostic products. He established the business division of the company and built Beijing branch for the company. He successfully secured the approval for two diagnostic products from Chinese governments. Prior to this, David was a research scientist and business development and licensing manager at Pharmacia Corporation in Kalamazoo, MI. David received an MD from Xiang Ya Medical School in China, and an MBA from the University of Michigan in Ann Arbor, MI, with a concentration in strategy and marketing.

B3 - Business Session 3: Start-Up Clinic

Phillip P. Chan, MD, PhD

Partner, NJTC Venture Fund
phillip@njtcvc.com

BIOGRAPHY

Dr. Phillip Chan leads healthcare and life science investments for the NJTC Venture Fund, an $80M early stage venture capital fund focused on New Jersey and the surrounding regions. He was instrumental in the investment of nine portfolio companies and is currently a board director of Andrew Technologies and IntegriChain, and a board observer for Cerionx, InstaMed, Intra-Cellular Therapies, and Sword Diagnostics.

Phillip received his MD and PhD in Genetics from the Yale University School of Medicine where he helped pioneer new advances in oligonucleotide-based gene therapy. Phillip completed his Internal Medicine residency at the Beth Israel Deaconess Medical Center at Harvard and is an internal medicine physician, with board-certification from the American Board of Internal Medicine. He also holds a BS in cell and molecular biology from Cornell University, graduating with honors and distinction.

B3 - Business Session 3: Start-Up Clinic

Karen Hong, PhD

Principal, ProQuest Investments
karenh@proquestvc.com

BIOGRAPHY

Founded in 1998, ProQuest Investments is a healthcare venture capital firm with over $875 million under management. ProQuest has 12 deal professionals and three offices, a headquarters in Princeton, and additional offices in San Diego and Montreal.
Dr. Karen Hong joined ProQuest in 2001 as an Associate and became a Principal in 2004. Prior to joining ProQuest, Dr. Hong provided technical consultation to the healthcare group at BancBoston Ventures and pursued academic research in molecular biology and chemistry. Most recently, she led numerous research projects in the area of mammalian cancer genetics and genomics in the laboratory of Dr. Eric Lander at the Whitehead Institute for Biomedical Research.

Currently, Dr. Hong serves on the Board of Directors of Agile Therapeutics and represents ProQuest as an observer on the Board of Directors of BioRexis Pharmaceutical Corp. In addition, she works closely with ProQuest portfolio companies Palatin Technologies and Novacea, among others.

Dr. Hong received a B.S. in chemistry and a B.A. in molecular biology from the University of California at Berkeley, where she graduated with honors and as a member of Phi Beta Kappa. She received a Ph.D. in biology from the Massachusetts Institute of Technology.

P2 – Plenary (Business) Session 2: Emerging Financial Services

Session Chair

Shin-Yi Chou

Associate Professor, Department of Economics
Lehigh University
syc2@lehigh.edu

BIOGRAPHY

Shin-Yi Chou received her B.A. from National Taiwan University in 1994 and her Ph.D. from Duke University in 1999. She is currently an Associate Professor of Economics and Frank L. Magee Fellow at Lehigh University, and a Research Associate at the National Bureau of Economic Research. Her research focuses on three aspects: quality and cost of health care, economic analysis of obesity, and how health insurance and education affect behavior/health outcomes. Her recent research on parental education and child well-being and national health insurance and child health are funded by National Institute on Child Health and Human Development and National Science Foundation, respectively. Portions of her work have been published in *Journal of Health Economics, Rand Journal of Economics, Review of Economics and Statistics, Health Economics*, *Journal of Public Economics* and *Journal of Applied Econometrics*.

P2 – Plenary (Business) Session 2: Emerging Financial Services

Dr. Paul Bennett

Chief Economist, Research
Senior Vice President
New York Stock Exchange
pbennett@nyse.com

BIOGRAPHY

Paul B. Bennett is senior vice president and chief economist of the NYSE.
As chief economist and head of the Research department at the New York Stock Exchange, Paul Bennett is responsible for analytic support for the Exchange's various business and public-policy activities, and for support of academic and other professional research into equities market issues.

Before joining the NYSE in 2001, Mr. Bennett was a senior officer and economist of the Federal Reserve Bank of New York, where he had worked since 1978. At the Fed, Mr. Bennett headed the Capital Markets Research division, was editor of the Bank's research journal and, prior to that, vice president for Fedwire Funds and Securities Transfers, among other responsibilities. Mr. Bennett has published numerous papers on finance, economics, and securities markets in both academic and practitioner journals.

Mr. Bennett holds a Ph.D. in economics from Princeton University and a B.A. in economics from the University of Chicago.

P2 – Plenary (Business) Session 2: Emerging Financial Services

Yangru Wu

Professor of Finance and Economics and Director of Quantitative Finance Program
Rutgers Business School-Newark and New Brunswick, Rutgers University
111 Washington Street
Newark, NJ 07102-3027
Tel: 973-353-1146
Fax: 973-353-1233
Email: yangruwu@andromeda.rutgers.edu
Homepage: http://andromeda.rutgers.edu/~yangruwu

BIOGRAPHY

Yangru Wu, PhD., is Professor of Finance and Economics and Director of Quantitative Finance Program at Rutgers Business School-Newark and New Brunswick, Rutgers University. He earned his PhD from Ohio State University. His current research interests include optimal trading strategies in foreign exchanges and international equities, tests for financial bubbles and open economy macroeconomics. Dr. Wu has published numerous articles in leading journals in Finance and Economics and has won the best paper prizes awarded by the Financial Management Association.

P2 – Plenary (Business) Session 2: Emerging Financial Services

Dunmu Zi

Hedge Systems Inc.
dunmuj@hedgesys.com

BIOGRAPHY

Dr. Dunmu Zi is a renowned Wall Street professional in financial engineering and financial modeling. Dr. Zi acquired a mathematical Ph.d. degree from Brown University. Dr. Zi worked in many years in Gifford Fong Associates assisting Dr. Oldrich Alfons Vasicek, the founder of the Vasicek model and the company KMV, build the infrastructure of the Vasicek and KMV models used today. Since 1997, Dr. Zi started his own company Hedge Systems Inc. that sells financial modeling expertise and risk management solutions to the industry. His clients include major investment banks on Wall Street.

T13 - Technical Session 13: Nanotechnology (IV)

Session Chair

Christopher Li

Associate Professor, A. J. Drexel Nanotechnology Institute
Department of Materials Science and Engineering
3141 Chestnut Street, LeBow 443
Drexel University
Philadelphia, PA 19104
(215)895-2083 (O), (215)895-6760 (F)
chrisli@drexel.edu, http://www.mse.drexel.edu/srg/

BIOGRAPHY

Christopher Li received his B. S. from the University of Science and Technology of China in 1995 and his Ph.D. from the Department of Polymer Science, The University of Akron in December, 1999. After working as a post-doc associate with Stephen Cheng for 2 years, he joined Drexel University, the Department of Materials Science and Engineering in January, 2002 as an assistant professor. He was a visiting professor at the Air Force Research Laboratory from June 2004 - August 2004. He is going to be promoted as an associate professor in September, 2007.

His research interests are on *Structural and Morphological Study on Ordered Hybrid Materials*. His lab works on developing novel methods to synthesize polymer/low-dimensional solids complexes and studying their electrical, mechanical and optical responses. Strategies that have been employed include polymer single crystal templates, liquid crystalline block copolymer self assembly and hierarchical assembly using holographic polymerization and block copolymer self assembly.

Christopher Li has received the Bradley Stoughton Young Teachers Award from ASM (2006), outstanding research award from the Department of Materials Science and Engineering, Drexel University (2006), DuPont Young Professor Award (2005), PERKIN ELMER - ICTAC (international confederation for thermal analysis and calorimetry) Young Scientist Award (2004), NRC/US AFOSR Summer Faculty Fellowship Award (2004), Mettler-Toledo Thermal Analysis Educational Award 2003, NSF-CAREER Award (2003), and 3M Non-Tenured Faculty Award (2003).

T13 - Technical Session 13: Nanotechnology (IV)

The potential anticancer effects of electronegative LDL, a biological nanoparticle

Chu-Huang (Mendel) Chen, M.D., Ph.D.

Associate Professor of Medicine
Clinical Director, Behavioral Science Research Center
Section of Atherosclerosis and Vascular Medicine
Baylor College of Medicine
Houston, TX 77030
cchen@bcm.tmc.edu
(713) 798-4217

ABSTRACT

Electronegative low-density lipoprotein (LDL) is a subclass of LDL that is potentially atherogenic. By subjecting LDL isolated from hypercholesterolemic human plasma (with LDL-cholesterol > 160 mg/dL) to ion-exchange chromatography, we divided LDL into 5 subfractions, L1–L5, with increasing electronegativity. While L5 is the most electronegative subfraction, more than 95% of the total LDL belongs to the L1 subgroup, which represents the regular LDL. In cultured human vascular endothelial cells, L5 induced marked apoptosis, whereas L1 didn't. L5 also inhibits differentiation and maturation of endothelial progenitor cells. By inhibiting the growth of endothelial and endothelial progenitor cells, L5 can effectively impair angiogenesis during tissue growth. With the longest dimension of less than 30 nm, L5 is a biological nanoparticle. It is a complex particle that contains the hydrophobic triglyceride and cholesteryl esters in the core, and the hydrophilic phospholipids, cholesterol, and apolipoproteins on the surface. Its structural characteristics are being determined by the state-of-the-art cryo-electron microscopy. Basically, its shape and consistency are different from those of L1. As a normal LDL, L1 contains apolipoprotein B100 (apo-B100) exclusively, whereas L5 contains apo-A1, apo-CII, apo-CIII, and apo-E, in addition to apo-B100. One most important distinction is that L5 is internalized by endothelial and endothelial progenitor cells through lectin-like oxidized LDL receptor-1 (LOX-1), while L1 is internalized by the normal LDL receptor. Transduced by LOX-1, L5's signaling disrupts a fibroblast growth factor 2-dependent autoregulation system that involves protein kinase Akt. It also destroys mitochondrial membrane integrity.

Because of L5's cytotoxic effects, we investigated whether its harmful properties could be used for therapeutic purposes. Compared with the experimentally prepared copper-oxidized LDL (oxLDL), the naturally occurring L5 is only minimally oxidized. However, the two share the same functional properties. In the initial stage of developing this new technique, we use oxLDL as a tool but will substitute L5 for oxLDL when an effective model is constructed.

Exposing oral cancer cells to oxLDL resulted in apoptosis and depletion of mitochondrial membrane potential in a concentration-dependent manner. To avoid potential side effects from damaging endothelial cells while enhancing the cytotoxic effect on cancer cells, the exposed peptide functional groups were modified to link to anti-Her2 monoclonal antibody. The attempt yielded a synergistic anti-cancer effect in the anti-Her2 conjugated oxLDL hybrid as compared to that of oxLDL or antibody alone. On the basis of these initial findings, we are constructing a comprehensive hybrid nanoparticle consisting of oxLDL, negatively charged polymers, the anti-Her2 monoclonal antibody, and doxorubicin.

Take viruses for example, biological nanoparticles have been used for gene transfer and drug delivery. Endogenous biological nanoparticles, such as L5 and oxLDL, harbor intrinsic advantages of low or no immunogenicity and well-documented signaling pathways. Modification of these nanoparticles as delivery vehicle or reporter system holds great potentials for advanced applications in disease diagnosis and therapy. Moreover, tracing these nanoparticles in either healthy or cancer cells will greatly advance our understanding of basic cell biology.

BIOGRAPHY

Chu-Huang (Mendel) Chen received his M.D. degree from Kaohsiung Medical University (then Kaohsiung Medical College) in 1978. He was Chief Resident of Pathology at Chang-Gung Memorial Hospital when he started the Ph.D. program in Physiology at Texas Tech University at Lubbock, Texas in 1981. After completing the graduate program in 1986, he received residency training in Internal Medicine at Maryland General Hospital and University of Maryland. In 1989, he continued his clinical training as a Cardiology Fellow at Baylor College of Medicine in Houston, Texas. In 1992, he accepted a position of Instructor at Baylor and is now an Associate Professor of Medicine, in the Section of Atherosclerosis at the same institution. Clinically, Dr. Chen is a attending physician, who rounds with medical teams at Baylor affiliated hospitals, and is also Clinical Director of the Behavioral Medicine Research Center, who supervises patient management for obesity and other related clinical studies. In basic science, Dr. Chen's expertise is in vascular biology. Their current focus is on chemical and functional characterization of L5 isolated from the plasma of patients with hypercholesterolemia (elevated LDL cholesterol), diabetes, or a chronic smoking history. They have identified several novel signaling pathways and are aiming at identifying new therapeutic targets for these diseases. Dr. Chen has been rewarded several grants for the studies of L5 and one of his postdoctoral fellows also recently won an American Heart Association Fellowship for a studying specific gene branched our from the main theme of the general goal of his laboratory. Dr. Chen's team has published frequently in top journals in their field, including *Circulation*, *Circulation Research*, *Diabetes*, and *ATBV* (*Arteriosclerosis, Thrombosis, and Vascular Biology*). Currently, Dr. Chen is collaborating with Dr. Dar-Bin Shieh of National Cheng Kung University in Taiwan in developing an LDL-based hybrid nanoparticle aimed at treatment of cancers.

T13 - Technical Session 13: Nanotechnology (IV)

A Liquid Crystalline *n*-type Semi-conducting Dye with Crystalline π Stacks

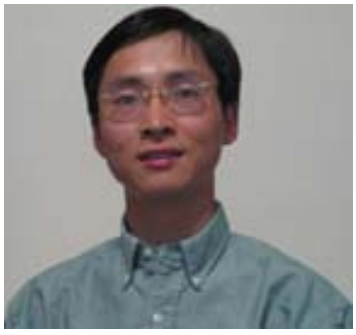
Shi Jin

Assistant Professor, Department of Chemistry
College of Staten Island and the Graduate Center
The City University of New York
Staten Island, NY 10314
Tel: 718-982-3890, Fax: 718-982-3910
Email: jin@mail.csi.cuny.edu

ABSTRACT

Nature-occurring, optically pure α-amino acids were successfully integrated into novel chiral liquid crystalline *n*-type organic semi-conducting dyes as the structure-controlling unit. By finely tuning the steric hindrance in forming π stacks, a series of highly soluble, electron-deficient liquid crystalline perylene tetracarboxylic acid diimides were obtained. Among which the first liquid crystalline material with crystalline π stacks was discovered. X-ray diffraction suggests that the room temperature liquid crystalline phase consists of alternating 2D crystalline mesogen layers and liquid-like alkyl layers. As the part of 2D crystalline order, π stacks are of crystalline order. It is expected that crystalline π stacks should lead to substantially improved charge-carrier mobility than found in conventional LC materials. This property, in combination with the room temperature liquid crystallinity and inherent optoelectronic properties of the dye core, makes it a promising material for use in optoelectronic devices.

BIOGRAPHY



Shi Jin was awarded his Ph. D. degree in polymer science by the University of Akron (Akron, Ohio) in 2001.

He is currently an Assistant Professor in department of chemistry at College of Staten Island, the City University of New York. He worked in Maurice Morton Institute of polymer science at the University of Akron from 2002 to 2004. His research interests include charge transport liquid crystals for photonic applications, highly conjugated conducting polymers and ionic conducting polymers.

He is a member of the American Chemical Society and the American Physical Society.

T13 - Technical Session 13: Nanotechnology (IV)

Synthesis, Self-assembly and Integration of Multisegment Nanowires

Zhiyong Gu

Assistant Professor, Department of Chemical Engineering
and CHN/NCOE Nanomanufacturing Center
University of Massachusetts Lowell, Lowell, MA 01854
Tel: (978) 934-3540; E-mail: Zhiyong_Gu@uml.edu

ABSTRACT

Synthesis and fabrication of nanomaterials have been one of the most exciting and rapidly growing areas in the past decade. At the nanometer scale, many material properties may alter, for example, optical, mechanical, electrical, and magnetic properties, due to higher surface-to-volume ratio. However, in order to enable nanotechnology to fully manipulate and utilize nanomaterials to make nanodevices, nanoelectronics, or nano-products in general, new assembly and integration strategies have to be developed or created since the conventional microfabrication process is approaching its limit in terms of size and cost-effective mass production.

In this talk, I will present our recent effort in fabricating and assembling one of the most promising nano-building blocks – nanowires (nanorods), and the integration of nanowires into ordered structures that may find applications in electronics and medicine. Electrodeposition in nanoporous templates has been used to synthesize one- and multi-component nanowires in the diameter range of 15-200 nm and length up 20 μm. Metallic, polymeric, and hybrid nanowires have been fabricated in very large quantity (10^9-10^{10} wires/cm^2) in this way. Two techniques will be described to assemble and integrate nanowires into ordered 1-dimensional (1D), 2D and 3D structures. The first technique utilized surface tension driven self-assembly in a fluidic medium, in which the nanowires were selectively functionalized and then permanently bonded via a polymerizable adhesive. The second technique involved the utilization of nanoscale solder to bond nanowires. Chemical and electrical characterizations were conducted for the solder interconnects formed between nanowires and their functionality.

BIOGRAPHY

Zhiyong Gu completed his undergraduate studies at Qingdao Institute of Chemical Technology (now Qingdao University of Science and Technology) in China in 1996. He studied for about two years at Zhejiang University before moving to the US in 1999, where he received his M.S. from University of Notre Dame and Ph.D. from the State University of New York at Buffalo in 2001 and 2004, respectively, all in Chemical Engineering. From April 2004 to August 2006, he worked as a Postdoctoral Fellow at the Department of Chemical and Biomolecular Engineering at the Johns Hopkins University. In September 2006, Zhiyong joined the Department of Chemical Engineering at University of Massachusetts Lowell as an Assistant Professor. He is a member of UML CHN/NCOE Nanomanufacturing Center. His current research interests are: nanomaterials and nanotechnology, nanowires, self-assembly and directed assembly, amphiphilic block copolymers, lead-free solders, nanocomposites, interfacial phenomena, thin film and coatings, and novel nanoscale integration for electronics, sensors and biomedical applications.

Zhiyong has published 4 book chapters and over 20 refereed papers, and has over 40 presentations in national and international conferences and meetings. He received the ACS YCC Leadership Development Award in January 2007. He is members of American Institute of Chemical Engineers (AIChE), American Chemical Society (ACS), Materials Research Society (MRS), American Association of Pharmaceutical Scientists (AAPS), American Association for the Advancement of Science (AAAS), and Sigma Xi.

T13 - Technical Session 13: Nanotechnology (IV)

Macrostructures of Carbon Nanotubes

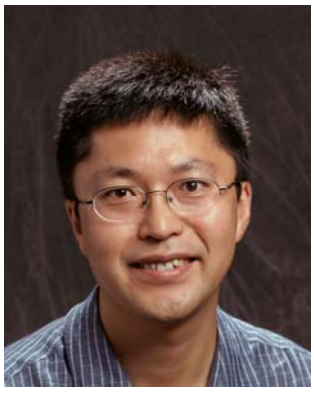
Bingqing Wei

Associate Professor, Department of Mechanical Engineering
University of Delaware
Newark, DE 19716
Tel: 302-831-6438, Fax: 302-831-3619
Email: weib@udel.edu

ABSTRACT

Carbon nanotubes have fascinating properties. In order to use these novel one-dimensional structures for applications such as in nano-electronic, nano-mechanical and electrochemical energy storage device and as structural elements in various composites, the structure of nanotubes needs to be tailored and various architectures and macroscale assembles have to be configured using nanotube building blocks. Nanotube macrostructures are macroscopically organized groups of CNTs, which are expected to have excellent properties implying promising applications. Recently, there has been growing interest in nanotube macrostructures because of their unique and usually enhanced properties and tremendous potential for applications. Realization of large-scale organized nanoscale structures of desired shape and form is important for obtaining scaled-up functional devices. If a synthetic method can produce high yield of nanotube macrostructures, these structures will have tremendous potential for fundamental research on these devices. This presentation will focus on the chemical vapor deposition of multiwalled carbon nanotubes to assembly directly on planar substrates into hierarchical macrostructures that include oriented and mutually orthogonal arrays, ordered bundles, and porous membranes. Super-long singlewalled nanotube strands and macro-films with controlled thickness and size through modification of a conventional method will also be discussed. In addition to assembling different nanotube arrays, some of our recent efforts will be summarized in this presentation, including exploiting electrical, optical and electrochemical properties of super-long nanotube strands and macrofilms and developing nanotube energy storage devices.

BIOGRAPHY



Bingqing Wei received his Ph.D from Tsinghua University in 1992 and is currently an Associate Professor at the University of Delaware. Before joining UD, he was an Assistant Professor in the Department of Electrical & Computer Engineering and Center for Computation & Technology

at Louisiana State University. He worked as a Post-doctorate Research Associate at Rensselaer Polytechnic Institute, Department of Materials Science and Engineering and Rensselaer Nanotechnology Center from 2000 to 2003. Dr. Wei was a visiting scientist for Max-Planck Institut für Metallforschung, Stuttgart, Germany in 1998 and 1999. From 1992 to 2001, he was a faculty member serving as an Associate Professor from 1994 to 2001 and Lecturer from 1992 to 1994 in the Department of Mechanical Engineering at Tsinghua University in Beijing.

Bingqing Wei's research interest lies on carbon nanotubes and related nanostructured materials, from structural, physical, mechanical and chemical characterizations to nanodevice applications. He has worked on nanotubes for a decade and made significant contributions in controllable synthesis of carbon nanotubes. His scholarly achievements in the field of nanomaterials and nanotechnology and, particularly in the research of carbon nanotubes are fully reflected from his 5 book chapters, more than 140 papers published in refereed international journals, including *Nature* and *Science*, more than 70 scientific conference presentations and over 40 invited talks and seminars in academic and industry worldwide. His research work has been extensively cited **(**more than 2000 times**)** by peer scientists and has also been highlighted many times in scientific journals, web journals and public media, including *Nature, Science, Proceedings of the National Academy of Sciences of USA, Science News, PhysicsWeb, The New York Times, USA Today, Materialstoday, MRS Bulletin, Chemical and Engineering News, Innovation Report Forum for Science, Industry and Business, Nanotechweb.org,* etc. His recent research focuses on controllable synthesis of patterned nanotube architectures and macroscale 1-, 2-, and 3 dimension nanotube entities, physical, chemical, electrochemical and mechanical property characterizations of these entities, and their device applications for energy conversion and storage.

T14 - Technical Session 14: Bioinformatics & Systems Biology (IV): High-Throughput Genotyping Studies

Session Chair

Mingyao Li

Assistant Professor, Department of Biostatistics and Epidemiology
University of Pennsylvania School of Public Health
Tel: 215-746-3916
Fax: 215-573-4865
Email: mingyao@mail.med.upenn.edu

BIOGRAPHY

Mingyao Li received her B.S. in Mathematics from Nankai University, and Ph.D. in Biostatistics from the University of Michigan. In 2006, she joined the Department of Biostatistics and Epidemiology at the University of Pennsylvania as an Assistant Professor.

Her main research area is statistical genetics. In particular, she is interested in developing statistical methods and computational tools for identifying and characterizing genetic variants that influence susceptibility to complex diseases. Much of her research has focused on the use of linkage disequilibrium in the mapping of complex disease susceptibility genes. Her current research work involves evaluating and improving power for genome-wide association studies, and analysis of copy number variations.

In addition to methods development, Dr. Li is also interested in collaborating with researchers seeking to identify complex disease susceptibility genes. Her collaborative research includes studies of the genetics of age-related macular degeneration, type 2 diabetes, cardiovascular disease, autism and schizophrenia.

T14 - Technical Session 14: Bioinformatics & Systems Biology (IV): High-Throughput Genotyping Studies

Genome wide association studies - the current revolution in disease gene discovery

Struan F.A. Grant

Associate Director, Center for Applied Genomics
Abramson Research Center, The Children's Hospital of Philadelphia
3615 Civic Center Boulevard
Philadelphia, PA 19104-4318
Tel: 267-426-2795, Fax: 267-426-0363
Email: grants@chop.edu

ABSTRACT

The field of human genetics has advanced rapidly in recent years. It is clear that both genetic determinants and environmental factors play a role in the causation of complex diseases, such as asthma and diabetes. However, the genetic complexity of multi-genetic disorders remains poorly understood underpinning the important need of understanding ethnic and sex-related differences in the context of the linkage disequilibrium (LD) structure of the human genome, and effective approaches are needed that allow for gene–gene and gene–environment interaction studies. While traditional linkage and association studies have been highly successful in uncovering variants that underlie monogenetic disorders and delivered some success in the field of multi-genetic disorders, the sequencing of the human genome together with the completion of the International HapMap Project mark the start of a new phase in human genetics. The HapMap project provides an unprecedented resource to investigators by characterizing the patterns of genetic variation and LD structure across four geographical populations, facilitating the design of genome-wide association studies and unveiling some of the complexity of human genetic diversity. With the rapid development in new technology platforms investigators are enabled with tools to conduct high-throughput experiments scanning through the whole genome in search for genes and variants that underlie many of the common diseases that affect human beings. Several examples of such discoveries will be presented.

BIOGRAPHY

Dr Struan Grant is the Associate Director of the Center for Applied Genomics at the Children's Hospital of Philadelphia. He has been conducting human genetics research for over 10 years. The highlights of his career include the discovery and subsequent characterization of the polymorphic Sp1 site in the *COL1A1* gene and its association with osteoporosis during both his PhD studies at the University of Aberdeen in Scotland and his post-doctoral work at the Garvan Institute in Sydney, Australia, and the identification of variation in the *TCF7L2* gene explaining more that 20 percent of type 2 diabetes cases while employed as the Division Head of Cardiovascular and Metabolic disease research at deCODE Genetics in Reykjavik, Iceland. His current work continues to primarily focus on metabolic disease, with specific focus on pediatrics; distillation of the genetic component in complex traits should, in many cases, be easier to determine in children, where the relatively short period of their lifetime limits the impact of environmental exposure.

T14 - Technical Session 14: Bioinformatics & Systems Biology (IV): High-Throughput Genotyping Studies

Efficient Use of Family Data in Genome-Wide Association Scans

Wei-Min Chen

Center for Statistical Genetics
Department of Biostatistics
University of Michigan
1420 Washington Heights
Ann Arbor, MI 48109
Tel: 734-763-4401
Fax: 734-615-8322
Email: wechen@umich.edu

ABSTRACT

With millions of single nucleotide polymorphisms (SNPs) identified and characterized, genome-wide association (GWA) studies are underway to identify susceptibility genes for complex traits and diseases. Both efficient designs and rapid algorithms for data analysis are crucial for a practical genome-wide association scan. In this talk I first illustrate a typical approach for analyzing a genome-wide association scan that includes only unrelated individuals. Then I focus on efficient designs and analytical strategies for family data. I show that combining high-resolution SNP genotypes for just a few individuals in a pedigree with sparse marker data from a typical linkage scan allows genotypes for many related individuals to be estimated probabilistically. Given limited genotyping resources, incorporating these estimated genotypes into tests of association can produce substantial increases in power. Either the Elston-Stewart or the Lander-Green algorithm can be used to calculate a probability distribution for each missing genotype, and the resulting probability distributions can be incorporated in a rapid family-based association test. I illustrate the use of this genotype imputation and efficient test on two data sets. The first data set consists of 27 gene expression phenotypes in 20 3-generation families (the CEPH Pedigrees). I show the GWA analysis combining ~800K SNPs available for 90 grandparents and parents with ~6K SNPs available for all 168 individuals. In addition to increasing evidence for association of 15 previously identified *cis*-acting associated alleles, our genotype inference algorithm allowed us to identify 4 novel *cis*-acting associated alleles that were missed when analysis was restricted to individuals with the high-density SNP data only. In the second data set, among ~4,500 extensively phenotyped individuals that were also genotyped at 10K SNPs, we selected ~1,400 individuals to be genotyped at additional 500K SNPs. I illustrate some of the association signals detected using our method.

BIOGRAPHY

Wei-Min Chen, Ph.D., is a postdoctoral fellow in the laboratory of Gonçalo Abacasis at the University of Michigan Center for Statistical Genetics. He received his Ph.D. from Johns Hopkins University. His work currently focuses on the statistical analysis of whole-genome association studies.

Wei-Min Chen received his B.S. in probability and statistics from Peking University in 1996 and his Ph.D. in biostatistics from Johns Hopkins University in 2004. He got his postdoctoral training in statistical genetics at University of Michigan. His research focuses on the design and statistical analysis of human gene mapping data. Recently, his research has focused on the development of methods for analyzing genome-wide SNP data in datasets that include thousands of individuals.

T14 - Technical Session 14: Bioinformatics & System Biology (IV): High-Throughput Genotyping Studies

High-resolution copy number variation detection via SNP genotyping

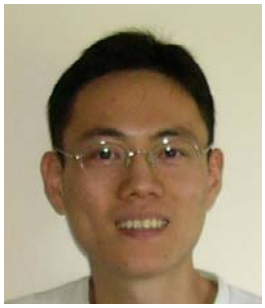
Kai Wang

Department of Genetics
University of Pennsylvania
Philadelphia, PA 19104
Tel: 215-898-0021, Fax: 215-573-2892
Email: kai@mail.med.upenn.edu

ABSTRACT

Copy number variation (CNV) refers to segments of DNA sequences that are present at variable copy numbers in the human genome, in comparison to a reference genome assembly. Previous studies typically use array-CGH based methods for CNV detection, with resolution limited to tens or hundreds of kilobases, so the vast majority of small CNVs are missed by these methods. Here we present a hidden Markov Model (HMM) approach that uses Illumina Infinium HumanHap550 high-density SNP genotyping data for CNV detection. In the HMM model, the emission probabilities of the total signal intensity and allelic intensity ratio for each SNP are modeled through a mixture distribution, indexed by the population frequency of alleles in a large reference population. The HMM transition probabilities of copy number states are dependent on distances between neighboring SNPs. The HMM parameters are estimated using the Baum-Welch algorithm. Since most CNVs are Mendelian inherited, the pedigree structure can be optionally used *a posterior* to validate CNV calls. We applied our method on ~1000 samples from disease cohorts and controls, and identified ~22,000 CNVs with median size of 15Kb, representing 10-100 fold increase of resolution over array-CGH based studies. About 35% of the detected CNVs are less than 10Kb, underscoring the importance of studying small CNVs for a comprehensive understanding of human genetic variation. For detected CNVs, we also describe a general strategy of combining PCR and resequencing to identify the exact breakpoint. This combined approach leads to 10^5 fold increase of resolution in CNV detection and mapping. Our results demonstrate the feasibility of comprehensive genome-wide CNV fine-mapping via high-density SNP genotyping. Given the unprecedented resolution, our method unveils a new avenue towards genetic and functional studies on small and common CNVs.

BIOGRAPHY



Kai Wang received his B.S. in Biochemistry and Molecular Biology from Peking University, his master's degree in Tumor Biology from May Clinic, and his Ph.D. in Microbiology from

University of Washington. He is currently under postdoctoral training with Prof. Maja Bucan at Department of Genetics, University of Pennsylvania.

Kai Wang's current research focused on application of computational and statistical methods in human genetics research. He is working on analyzing SNP genotyping data from different species, developing novel pathway-based approaches for interpreting genome-wide association studies, and analyzing copy number variation in human genome. These methods are being applied to identify genetic factors underlying complex human psychiatric and neuron-developmental diseases, including bipolar disorder and autism.

T15 - Technical Session 15: Nanotechnology (V)

Theoretical Study of the Raman Spectra of Graphite Oxide Models, and Comparison with the Experiment

Konstantin N. Kudin, Bulent Ozbas, Hannes C. Schniepp, Robert K. Prud'homme, Ilhan A. Aksay, Roberto Car

Department of Chemistry, Princeton University
kkudin@Princeton.EDU

ABSTRACT

Graphite oxide (GO) has been known since 1859 and several GO models have been suggested, however its detailed structure is still under debate and a definitive atomistic model is not yet available. I will discuss our efforts to tackle this issue by comparing to the experimental data the calculated Raman spectra of various functional fragments that might appear during the chemical transformation of graphite. One of our findings is that the alternating pattern of single-double carbon bonds within the sp2 carbon ribbons provides a satisfactory explanation for the experimentally observed blue shift of the G band in GO relative to graphite. To obtain these single-double bonds, it is necessary to have sp3 carbons on the edges of a carbon ribbon.

BIOGRAPHY

Dr. Kudin got his Bachelor degree from Higher Chemical College of Russian Academy of Sciences in Moscow. Then he went to Rice University in Houston for his PhD degree, where he worked with Prof. Scuseria on the development of linear scaling electronic structure methods. Specifically, during his PhD study Dr. Kudin wrote parts of Gaussian03 package, one of which is the local basis set method for calculations of systems with periodic boundary conditions. Then Dr. Kudin relocated to Princeton where he is now a research associate with Prof. Car in Princeton Institute for Science and Technology of Materials. His current research involves Car-Parrinello simulations of liquid water. Another area of his interest is concerned with theoretical studies of graphite products, where Dr. Kudin is collaborating with the experimental group of Prof. Aksay at the Chemical Engineering department, focused on making novel materials out of graphite.

T15 - Technical Session 15: Nanotechnology (V)

Self-Organization and Self-Healing — Study and Design of Materials at the Molecular Scale

Hannes C. Schniepp

Associate Research Scholar, Department of Chemical Engineering
Princeton University, Princeton, NJ 08544
Tel: 609-258-9121
schniepp@princeton.edu

ABSTRACT

Amphiphilic molecules in aqueous solutions perform spontaneous self-assembly at solid–solution interfaces into a variety of different structures, depending on the molecule species and the type of solid. We are interested in applying this process—the basis of structure formation for several systems in nature—to develop new materials. As a model system we use simple surfactants such as sodium dodecyl sulfate (SDS), which we investigate by liquid-cell atomic force microscopy, enabling us to visualize and manipulate them in situ at the nanometer scale. The mechanisms for self-assembly and guided organization that we revealed, yield to highly ordered structures that can be exploited to produce nanostructured materials. Recently, we were able to demonstrate that these surface aggregates perform perfect self-healing within a few milliseconds, which can be employed for smart layers providing corrosion inhibition or lubrication. The work was conducted in the group of Prof. Ilhan A. Aksay at Princeton University.

BIOGRAPHY

Hannes C. Schniepp received his Dipl. Phys. (M.S. equivalent) from the Physics Department, University of Konstanz, Germany in 1999 and his PhD (Dr. sc. nat.) in 2004 from the Department of Chemistry and Applied Biosciences, Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland. During his diploma and PhD theses, he designed a combined fluorescence optical and scanning probe microscope that he applied to investigate fundamental topics in physics (quantum optics of fluorescent nanoparticles) as well as to biophysics (optical and atomic force-microscopic study of biomembranes and their transport properties). Since 2004 he has a postdoctoral position in the group of Prof. Ilhan A. Aksay at the Chemical Engineering Department, Princeton University.

Hannes Schniepp's current research activities are positioned in the field of biomimetic materials research. His two major lines of research encompass molecular surface self-assembly, including protein–surface interactions, as well as graphene-based materials and their nanocomposites. He is the author of pioneering publications in both fields.

B4 - Business Session 4: Getting Started: To Be a Biotech Entrepreneur

Phillip P. Chan, MD, PhD

Partner, NJTC Venture Fund
phillip@njtcvc.com

ABSTRACT

This fourth Business session will feature a panel of entrepreneurs who will discuss the challenges of founding and getting a start-up off the ground. The panelists will include a mix of founders and CEOs from drug development, medical device, and diagnostic companies, and will be moderated by Dr. Phillip Chan of the NJTC Venture Fund, a venture capital fund focused on seed and early stage funding for companies across a broad range of industries. Budding entrepreneurs who have recently started, or are thinking of starting, their own companies should benefit from this session, which will help them think through key issues by learning from other entrepreneurs' experiences.

BIOGRAPHY

Dr. Phillip Chan leads healthcare and life science investments for the NJTC Venture Fund, an $80M early stage venture capital fund focused on New Jersey and the surrounding regions. He was instrumental in the investment of nine portfolio companies and is currently a board director of Andrew Technologies and IntegriChain, and a board observer for Cerionx, InstaMed, Intra-Cellular Therapies, and Sword Diagnostics.

Phillip received his MD and PhD in Genetics from the Yale University School of Medicine where he helped pioneer new advances in oligonucleotide-based gene therapy. Phillip completed his Internal Medicine residency at the Beth Israel Deaconess Medical Center at Harvard and is an internal medicine physician, with board-certification from the American Board of Internal Medicine. He also holds a BS in cell and molecular biology from Cornell University, graduating with honors and distinction.

B4 - Buiness Session 4: Getting Started: To Be a Biotech Entrepreneur

Han Cao, PhD

Founder – BioNanomatrix
han@bionanomatrix.com

BIOGRAPHY

Dr. Han Cao graduated with BS degree from the University of Science and Technology of China (USTC) in 1990. He worked in China's National Plant Genetic Engineering and Protein Engineering Laboratory at Beijing University, and was accepted to graduate school in the United States in 1991. He obtained a doctorate degree in molecular biology from the University of Delaware. After finishing his postdoctoral training at the Institute for Human Gene Therapy of University of Pennsylvania Medical Center in 2000, he joined a multi-disciplinary project led by Howard Hughes Medical Institute Investigator Dr. Shirley Tilghman (current Princeton University President), which was funded by U.S. Defense Advanced Research Project Agency (DARPA) at Princeton University with over six million dollars. Han was engaged in the research and development of bionanotechnology and was key co-inventors of multiple inventions. At the end of year 2003, Han founded BioNanomatrix, one of the six platform startup companies of Princeton University.

BioNanomatrix has since raised 2.1 million dollars from public and private funds to develop nanodevices and systems for biomedical applications at single molecule level. Members of the NIH study section consider Bionanomatrix innovation very far-reaching, and if successful, will provide a platform to be applied to almost every aspect of the medical genetics and cell biology affected by genetic alterations, including cancer and many forms of genetic diseases. Bionanomatrix has recently signed a three-year research and development cooperation agreement with the National Cancer Institute (NCI).

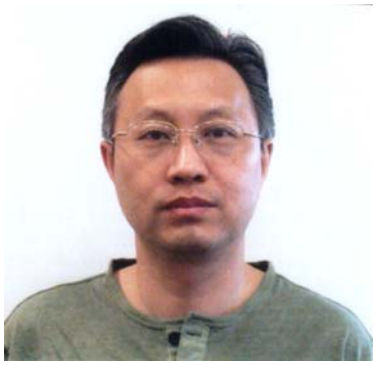
Dr. Cao is the Principal Investigator of two National Cancer Institute and the National Human Genome Research Institute-funded research projects. He is also a study section member of the National Cancer Institute Innovative Molecular Analysis Technology (IMAT) program. He is a member of founding editorial board of the journal of Nanomedicine.

B4 - Buiness Session 4: Getting Started: To Be a Biotech Entrepreneur

Joseph Huang, PhD

CEO - MicroDysis
jhuang@microdysis.com

BIOGRAPHY



Dr. Joseph Huang received his Bachelors degree in Electrical Engineering in 1982, Master degree in Biomedical Instrumentation in 1987, and a Ph.D. in Biomedical Engineering in 1992, with all highest honors. When he founded MicroDysis in 2003, he had over 20 years of experience in biomedical instrumentation, medical device, genetic analysis research and microfluidic design. The Company developed the world's smallest and only battery powered peristaltic micropump tailored for portable liquid and drug delivery devices, and is developing a biochip platform for clinical analysis and diagnosis. In December 2006, the Company received a Success Award from the New Jersey Small Business Development Center.

B4 - Buiness Session 4: Getting Started: To Be a Biotech Entrepreneur

Paul Guo, MS

President and CEO – AstaTech
gpaul@astatechinc.com

BIOGRAPHY

Paul Guo is the founder and president of AstaTech Inc that has subsidiaries in Canada, China. He received his Bachelors in Science degree from Sichuan University and Masters degree in organic chemistry from Dalian University and University of Manitoba in Canada. After graduation, Mr. Guo worked for Sterling Winthrop and Bristol-Myers Squibb in the Department of Medicinal Chemistry and Process Chemistry. In 1999, Mr Guo joined AstaTech Inc as one of its founders. AstaTech is involved in all aspects of pharmaceutical chemical services: from advanced intermediate catalog products, custom synthesis, contract research to contract manufacturing.

B4 - Buiness Session 4: Getting Started: To Be a Biotech Entrepreneur

Jie Yao, PhD

CEO, Hawkeye Vision
jieyaohawkeye@yahoo.com

BIOGRAPHY

Dr. Jie Yao is the founder of Hawkeye Vision, Inc. He has been the Principal Investigator of 10 research and development contracts with the U.S. federal government in the field of micro- and nano-optoelectronics (2006 ~ 2007 at Structured Materials Industries and Hawkeye Vision). Prior to founding Hawkeye Vision, Jie designed and developed a laser heterodyning system for the generation and detection of TeraHertz radiation for Goodrich Aerospace Division (2005) under a contract with U.S. Army Research Lab. At ASIP (2001 ~ 2005), a startup company specializing in integrated optoelectronics, he was the only designer responsible for lasers, modulators, photodetectors, monolithic photonic integration, fiber optic coupling, and the successful launch of various photonic integrated circuit products. At JDS Uniphase (2000 ~ 2001), Jie invented and patented high-speed photodiodes with sensitivity exceeding well-accepted textbook limits. Jie holds a Ph.D. (2000) and M.S. (1996) both in Electrical Engineering from Princeton University, where he developed the world's most sensitive Quantum Well Infrared Photo-detector (QWIP) for the early detection of inter-continental ballistic missiles. He obtained B.S. (1992) in Theoretical Physics with highest honor from Fudan University in Shanghai, China. Jie has 2 granted patents, 5 pending patent applications and 10 technical publications.

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