

Proceedings of the 2010 CAPASUS
Taiwan-US Conference
on
Nanotechnology

and

The Chinese-American Academic and
Professional Association in Southeastern
United States

The 34th Annual Conference

台美奈米科技學術研討會
美東南區中華學人協會第三十四屆年會
會刊

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Editors

Yao-wen Huang
Mac Liu

Technical Program Advisory Committee

Yao-wen Huang, Ray Wang,
Kevin Hsieh, Kuang-yueh Chiang, Li Kan Wang

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前言

緣由

美東南區中華學人協會（CAPASUS）歷年來都關懷臺美官方及非官方的互動關係，儘管每一階段都有其不同的時空背景，美東南區中華學人協會每年都會依當時的需求，舉行科技研討及學術交流。去年的臺美學術研討會的主題是環保及再生，其中的環保問題就包含了潛在的奈米污染所引起的問題，今年的主題將從奈米所帶來的負面影響轉換成正面的應用。最新的奈米科技，除了在機械、工程，電子，電腦，材料，通信，化學方面已有迅速突破，奈米科技也進入了生物醫學的領域。因為在它的快速發展之下，奈米科技的研發開始對人類的醫學，倫理，思想，法律，經濟，環境都造成不同層次的正面及負面的影響。

因為奈米科技是一個全新的領域，在奈米技術研發上的領先勢必將可將可帶動下一波的工業革命。21 世紀的先進國家只要能掌握了能源，寬頻，及奈米科技的研發優勢，就可立足於地球村上的制高點。美東南區中華學人協會希望在 2010 的年會中，藉臺美奈米學術研討會邀請台美的頂尖奈米人才來討論奈米科技的多方面的應用，期待藉這次會議研討的機會帶動經驗的交流，進一步使得臺灣在世界經濟及科技的領域中繼續保持其前瞻性和領先的地位，並回饋臺灣的奈米科技產業以及社會大眾，同時也得避免及預防在強大的經濟和市場利益的誘因下，而可能失去有條不紊地科學審慎研究的立場。

美東南區中華學人協會（CAPASUS）在臺灣及美國講員方面很榮幸的請到九位奈米科技專家包括到三位 keynote speakers 來參加臺美奈米科技研討會。Dr. Andrew H.-J. Wang（王惠鈞博士，中研院副院長）將發表台灣的科技研究政策與學術競爭力，Dr. Maw-Kuen Wu（吳茂昆博士 - 中央奈米國家型科技計畫總主持人，中央研究院物理研究所所長）將研討台灣的奈米技術之研究方向，美國國家奈米教育中心所長（National Education Center Nanotechnology）Dr. R.P.H.Chang（張邦衡教授）將強調奈米科技教育之重要。同樣是來自中央研究院的院士 Dr. Yuh-Lin Wang（王玉麟教授），也將專題演講奈米技術在原子與分子科學上的應用，Dr. Yia-Chung Chang（張亞中博士）將對奈米材料之應用做專題發表。在奈米生物醫學方面，中正大學的周禮君教授將發表他對奈米技術於生物傳感器之應用的研究，而亞特蘭大 Emory 大學醫學院的 Dr. Lily Yang（楊莉博士）將陳述奈米技術在醫學上之應用。在奈米農業方面，美國農業部（United State Department of Agriculture, USDA）的 Dr. Hongda Chen（陳宏達博士）將討論奈米科技在農業上之應用。Department of Food Science and Technology, University of Georgia, 同時也是中華學人協會前會長的黃耀文教授將研討奈米技術在食品安全系統之應用。會後（Post Conference）8/2/1010，所有的學者還會在 University of Georgia 的奈米中心做為期一天的奈米座談會。本年除了科技組

以奈米為中心主題之外，我們也安排了藝文組、醫療組及法律組對不同的主題做個別的分組討論，今年加了法律組的研討會，是希望每年都輪流換一些不同的專業領域 包括經濟、政治、等來多方面照顧到會員可能關心的議題。

會議目的

本研討會將分下列主題進行研討：

1. 探討奈米科技在不同科學領域上的應用
2. 研究奈米科技在農業上的影響
3. 了解奈米科技在生物醫學上的發展

預期效果

針對上述主題，主辦單位將邀請台灣和美國雙方產、官、學、研各界專家學者共同參與討論，並進行交流，預計可達成如下之預期效果

- 1) 促進台美奈米科技的學術研究交流
- 2) 探討奈米科技，奈米材料對環境、生態、食品等多方面的影響
- 3) 瞭解奈米醫學對人體健康的貢獻及影響

主辦單位

美東南區中華學人協會 (Chinese-American Academic and Professional Association in Southeastern United States, or CAPASUS)

指導單位

中華民國行政院國家科學委員會 (National Science Council, Taiwan, Republic of China)

協辦單位

駐美國臺北經濟文化代表處科技組 (Taipei Economic and Cultural Representative Office in the United States (TECRO, Science and Technology Division))

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| 陳存傑教授 | Former Professor of Mississippi State University |
| 衛高榮 | CEO of R. D. International Inc. |
| 黃金澤教授 | Professor, Department of Computer Science & Engineering, University of South Carolina |
| 盧博榮博士 | Science Leader, Oak Ridge National Laboratory |

Preface

According to the National Nanotechnology Initiative, the nanotechnology is defined as the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering, and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale.

A nanometer is one-billionth of a meter. A single gold atom is about a third of a nanometer in diameter, while a sheet of paper is about 100,000 nanometers thick. In nanoscale of 1 and 100 nanometers, unusual physical, chemical, and biological properties can emerge in materials. These properties may differ in important ways from the properties of bulk materials and single atoms or molecules.

The power of nanotechnology is rooted in its potential to transform and revolutionize multiple technology and industry sectors, including aerospace, agriculture and food, biotechnology, homeland security and national defense, energy, environmental improvement, information technology, medicine, and transportation. Discovery in some of these areas has advanced to the point where it is now possible to identify applications that will impact the world we live in.

Due to that the nanotechnology is going to change the world and the way we live, creating new scientific applications that are smaller, faster, stronger, safer and more reliable, the Chinese-American Academic and Professional Association in Southeastern United States (CAPASUS) has organized a US-Taiwan Conference on Nanotechnology in conjunction with the CAPASUS Annual Meeting in Atlanta, Georgia, USA from July 30 to August 1, 2010. Renowned nanotechnology experts in physics, chemistry, biology, medicine and education have been invited from both Taiwan and U.S. to give presentations. Through the discussion on topics and exchange of research experiences, the CAPASUS hope the Conference serve a platform for scientists to find a common interests and potential collaborated projects in the future as well as for the members to have an opportunity to explore new frontier of knowledge.

In addition, the CAPASUS has organized diversified programs during the Annual Meeting including Sessions on Art and Literature, Law, and Medicine; as well as entertainments for our members to enjoy the fellowship, friendship and networking.

Finally, a friendly remainder is given as following: (1) Welcoming Reception sponsored by the TECO from 6:00 pm to 8:00 pm on Friday followed by the Entertainment at Chinese Culture Center; (2) Annual Banquet on Saturday night.

This Proceeding will provide each of you an overview and the detail Conference and Meeting programs and activities. We hope you enjoy the Conference and have a nice stay in Atlanta.

議程 Program

美東南區中華學人協會 2010 年會及台美奈米學術研討會將分下列主題進行研討：

1. 科技組方面：奈米科技 (Nanotechnology) 在不同領域上的應用
2. 醫療組方面：眼球表面問題 (Ocular Surface Disorders)
3. 藝文組方面：中西美術的比較
4. 法律組方面：科技專利等

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| 7/31 (Sat) Atlanta Marriott Gwinnett Place (1775 Pleasant Hill Rd., Duluth, GA 30096) | | |
| 7:00 ~ 8:15 am | Registration (Continued) | Dr. Fred Chiou (邱耀輝博士) |
| 7:00 ~ 8:15 am | Breakfast at Hotel | Dr. Ray Wang (王祥瑞博士) |
| Independent Hall | | Moderator: |
| 8:15 ~ 8:45 am | | Dr. William Cheng (鄭義為副會長) |
| 8:15 ~ 8:20 am | | Dr. Willie Chen (陳英偉會長) |
| 8:20 ~ 8:25 am | Opening Ceremony | 駐亞特蘭大台北經濟文化辦事處 (TECO) 曾瑞利處長 |
| 8:25 ~ 8:45 am | | 駐美台北經濟文化代表處 (TECRO) 科技組張新雄組長、文化組張欽盛組長 |
| 8:45 ~ 12:00 pm | Plenary Session (Keynote Speakers) | Moderator: Dr. Yao-Wen Huang (黃耀文教授) |
| 8:45 ~ 9:45 am | Policy of Research in Science and Technology and the Academic Competitiveness in Taiwan 台灣的科技研究政策與學術競爭力 | Dr. Andrew H.-J. Wang (王惠鈞博士) |
| 9:45 ~ 10:00 am | Coffee Break (休息) | |
| 10:00 ~ 11:00 am | An Overview of the Nanotechnology Development in Taiwan 台灣的奈米技術之研究方向 | Dr. Maw-Kuen Wu (吳茂昆博士) |
| 11:00 ~ 12:00 pm | National Center for Learning and Teaching in Nanoscale Science 奈米科技教育之重要 | Dr. Robert .P.H Chang (張邦衡教授) |
| 12:00 ~ 1:00 pm | Lunch and New Member Introduction (午餐及新會員介紹) | Dr. Frank Hsu (徐孝華教授) |
| 7/31 (Sat) Sessions (分組專題演講) | | |
| 1:00 ~ 5:30 pm | A. Science and Technology Session (科技組) Gwnnett+Hall Room | Dr. Ray Wang (王祥瑞博士) |
| | B. Art & Literatures Session (藝文組) Walton Room | Dr. Kevin Hsieh (謝國昱教授) |
| | C. Law Session (法律組) Walton Room | Li Kang Wang, J.D. (王立綱律師) |
| Gwnnett+Hall Room | A. Science and Technology Session (科技組) | Moderator: Dr. Ray Wang (王祥瑞博士) |
| 1:00 ~ 1:45 pm | 奈米技術在原子與分子科學上的應用: 'Listen' to the 'sound' of bacteria using light enhanced by nanoparticle 藉奈米粒強化光來聽取細菌之音 | Dr. Yuh-Lin Wang (王玉麟博士) |
| 1:45 ~ 2:30 pm | 奈米材料之應用: Nanoelectronics and Nanophotonics | Dr. Yia-Chung Chang (張亞中博士) |

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| | 奈米電子與奈米光器 | |
| 2:30 ~ 2:45 pm | Coffee break (休息) | |
| 2:45 ~ 3:30 pm | 奈米技術在醫學上之應用: Theranostic nanoparticles for targeted cancer therapy and imaging 奈米粒在腫瘤標靶診療之應用 | Dr. Lily Yang (楊莉博士) |
| 3:30 ~ 4:15 pm | 奈米技術於生物傳感器之應用: Particle Plasmon Resonance Biosensors 粒子電漿共振傳感器 | Dr. Lai-Kwan Chau (周禮君博士) |
| 4:15 ~ 5:00 pm | 奈米科技在農業上之應用: Nanotechnology Opportunities in Agriculture and Food to Address Grand Societal Challenges 以奈米技術在農業食物之機遇回應社會層的挑战 | Dr. Hongda Chen (陳宏達博士) |
| 5:00 ~ 5:45 pm | 奈米技術在食品安全系統之應用: Application of Nanotechnology in Food Safety System | Dr. Yao-wen Huang (黃耀文教授) |
| Walton Room | B. Art & Literatures Session (藝文組) | Moderator: Dr. Kevin Hsieh (謝國昱教授) |
| 1:00 ~ 1:50 pm | Elementary Education in Taiwan and the United States: An Art Teacher's Perspective 從一位國小美術教師的觀點來看臺灣與美國的國小教育 | Dr. Kevin Hsieh (謝國昱教授) |
| 1:50 ~ 3:00 pm | Demonstration of Chinese Bird & Flower Painting 中國花鳥畫示範 | Dr. Lee Jan Jan (詹歷堅教授) |
| 3:00 ~ 3:30 pm | Nanopicture/Nanoart | Dr. Zhengwei Pan (潘正偉教授) |
| 3:30 ~ 3:40 pm | Coffee Break (休息) | |
| 3:40 ~ 4:30 pm | Compare Chinese and Western Traditional Painting 比較中國和西洋傳統畫 | Dr. Cecilia Jan (席莉雅博士) |
| Walton Room | C. Law Session (法律組) | Moderator: Li Kang Wang, J.D. (王立綱律師) |
| 4:30 ~ 5:00 pm | Nanotechnology Patent Law | Li Kang Wang, J.D. (王立綱律師) |
| 5:00 ~ 5:30 pm | Every-day Legal Issues with Running A Business in Georgia | John Wu, J.D. (吳志宏律師) |
| | | |
| 8/1 (Sun) | Atlanta Marriott Gwinnett Place (1775 Pleasant Hill Rd., Duluth, GA 30096) | |
| 8:45 ~ 12:00 pm Independent Hall | D. Medical Session (醫療組) Ocular Surface Disorders 眼球表面問題 | Moderator: Dr. Kuang-Yueh Chiang (江光悅醫師) |
| 8:45 ~ 9:15 am | Health Care Reform 健保政策改革 | Mr. Glenn Pearson |
| 9:15 ~ 10:00 am | Conjunctivochalasis and Amniotic Membrane Transplant 結膜鬆弛症和羊膜移植 | Dr. Scheffer Tseng (曾垂拱醫師) |
| 10:00 ~ 10:45 am | Treatment Paradigms for Blepharitis in the New Millennium 眼瞼炎的治療和診斷 | Dr. Barry Lee |
| 10:45 ~ 11:30 am | Ocular Allergies and Dry Eye Syndrome 過敏性結膜炎和乾眼症 | Dr. Anna Kao (高士茵醫師) |
| 11:30 ~ 11:55 am | Panel Discussion | Dr. Kuang-Yueh Chiang (江光悅醫師) |
| 11:55 ~ 12:00 pm | Closing Ceremony | 陳英偉現任會長、鄭義為新任會長 |

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| 7/31 (Sat) & 8/1 (Sun) am | Booth /Exhibition/Other activity 贊助單位展示及其他活動 | Exhibit Director: Mr. Todd Yu (尤思治) |
| Salon 6+7 Starts at 12:00 am, Sat. untill end of conference | CAPASUS Foundation Poster Competition 中華學人基金會學生論文發表 | Competition Chairperson: Dr. Yen-Con Hung (洪延康教授) |
| Salon 8 Open during conference | Glaucoma Screening (FDT for visual field test) (IOP measurement) (NW retinal imaging), pachymeter 青光眼視野、眼壓、視神經、角膜厚度檢查 | Mr. Roger W. Martin, Dr. Susie Cha (pre-registration required and limited to active members) |
| Salon 6+7 Open during conference | Book/Nanopicture & Art Exhibition 書展/奈米攝影及美術展 | 陳兆桐教授、陳光玉、羅昭容 |

中華民國建國一百週年籌備會簡訊

國父孫中山先生在海外成立興中會和同盟會，經過十次革命以期推翻腐敗的滿清王朝。到1911年10月10日武昌起義，終於成功。1912年元旦中華民國成立，國父就任臨時大總統。中華民國經過北伐，抗戰，最後來到了台灣。在這塊美麗的土地上，我們成長於此，接受教育於此，它與我們有不可分離的關係及感情。

明年是中華民國建國一百週年，全球華人已經熱烈展開籌備為中華民國慶祝一百歲生日。我們也非常榮幸能在美國東南部最大城市亞特蘭大展開慶祝活動。亞特蘭大中華民國百年慶祝活動籌備會已于今年4月23日成立，並分設活動、財務、文宣、公關、出版及募款六組；決定了全僑參與的四大活動：元旦升旗典禮、慶祝建國百年園遊會、國內訪問團公演、及雙十國慶擴大慶祝活動；各僑社也會掀起慶祝熱潮分別舉辦特別節目。所有的活動的精彩部份將會記錄下來，最後做成可收藏的紀念品。此項責任重大，意義深遠的出版組由美東南區中華學人協會擔綱，協會前會長洪金城教授負責紀念服裝的設計及採購。籌備會在此表示由衷感激。

敬祝美東南區中華學人協會業務蒸蒸日上，年會圓滿成功，大家健康平安。

亞特蘭大中華民國百年慶祝活動籌備會召集人：

僑務委員：黃美美、葉建榮、李本泉

10 Reasons for Learning Chinese in Taiwan

1 A Perfect Place to Learn Chinese

Mandarin Chinese is the official language of Taiwan. The most effective way to learn Mandarin is to study traditional Chinese characters in the modern, Mandarin speaking society of Taiwan.

2 A Repository of Chinese Culture

The National Palace Museum has a great collection of artifacts spanning the history of Chinese civilization. Taiwanese Opera and Glove Puppetry, and aboriginal culture, add to the cultural richness of Taiwan. Nowhere will international students find a better place to experience and learn about Chinese culture.

3 Learn Complete, Traditional Chinese Characters

Learning traditional characters makes it easy to identify lexical forms and hard to misunderstand the meaning of words. Moreover, the power and aesthetics of Chinese calligraphy can only be revealed and appreciated through traditional Chinese characters.

4 An Excellent Environment for Learning Chinese

Mandarin training centers in Taiwan provide high quality teachers and facilities, a variety of high quality courses for students of all levels of proficiency, and small classes. Most importantly, outside of class, you will be immersed in Chinese language and culture. Don't miss it!

5 Available Scholarships

To encourage students from foreign countries to learn Chinese, the government provides three scholarships. In addition, some Chinese learning centers provide scholarships.

△ See p.6-7 for more information

6 A Free and Democratic Society

Taiwan has a thriving, modern, free and democratic society. It is one of the safest countries in the world, and its infrastructure, from power to transportation to telecommunication, is top-notch.

7 Easy to Reach, A Great Place to Travel

Taiwan is served by a large number of international airlines and is easily reached from many countries in the world. Domestic airlines, bullet trains, and regional train systems provide excellent transportation within Taiwan.

8 High Standard of Living

Taiwan's infrastructure is advanced, and its law-enforcement and transportation, communication, medical and public health systems are excellent. In Taiwan, foreign students live and study in safety and comfort.

9 Test of Proficiency-Huayu

The Test Of Proficiency (TOP), or Huayu, is given to international students to assess their Mandarin Chinese listening and reading comprehension.

△ See p.10-11 for more information

10 Work While You Study

While learning Chinese in Taiwan, students may be able to work part-time. Students will gain experience and a sense of accomplishment communicating in Chinese, and they can earn some extra money.

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E-mail: cul@tecro.us

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Ad-2

Plenary session July 31, 2010

| | | |
|------------------|--|---|
| 8:45 ~ 12:00 pm | Plenary Session (Keynote Speakers) | Moderator: Dr. Yao-Wen Huang (黃耀文教授) |
| 8:45 ~ 9:45 am | Policy of Research in Science and Technology and the Academic Competitiveness in Taiwan 台灣的科技研究政策與學術競爭力 | Dr. Andrew H.-J. Wang (王惠鈞博士) |
| 9:45 ~ 10:00 am | Coffee Break (休息) | |
| 10:00 ~ 11:00 am | An Overview of the Nanotechnology Development in Taiwan 台灣的奈米技術之研究方向 | Dr. Maw-Kuen Wu (吳茂昆博士) |
| 11:00 ~ 12:00 pm | National Center for Learning and Teaching in Nanoscale Science 奈米科技教育之重要 | Dr. Robert .P.H Chang (張邦衡教授) |
| 12:00 ~ 1:00 pm | Lunch and New Members Introduction (午餐及新會員介紹) | Dr. Frank Hsu (徐孝華教授) |

Dr. Andrew H.-J. Wang 王惠鈞 副院長



Dr. Wang is the Vice President (Academic) of Academia Sinica. He is also a Distinguished Research Fellow of the Institute of Biological Chemistry. His research areas include Structural proteomics, drug discovery, synchrotron crystallography, structure-function relationship of enzymes and DNA

Dr. Wang hold following positions:

- | | |
|--------------|--|
| 1988-present | Member, Advisory Board (1988-1996); Adj. Research Fellow (1992-2002); Adj. Distinguished Research Fellow (2002-present), Institute of Mol. Biol., Taipei, Taiwan |
| 1990-93 | Member, Advisory Board, Biotechnology Center, UIUC |
| 1991-94 | Member, NIH BBCA Study Section |
| 1993-96 | Member, NSF Predoctoral Fellowship Review Panel |
| 1995-2002 | Editor, <i>European J. Biochem.</i> |
| 1998-2002 | Editorial Board, <i>Nucleic Acids Research</i> |
| 2001-2007 | President, Biophysics Society of ROC |
| 2001-2004 | President, Taiwan Society of Biochemistry and Molecular Biology |
| 2003-2006 | President, Taiwan Proteomics Society |
| 2004-present | Council Member, Taiwan Society of Biochemistry and Molecular Biology |
| 2003-2006 | Council Member, AOHUPO |
| 2003-present | Council Member, Human Proteomic Organization (HUPO). |
| 2006-present | Council Member, Taiwan Proteomics Society |
| 2006-present | Chair Professor, National Chung Hsing University |
| 2007-present | Distinguished Research Chair Professor, National Taiwan University |
| 2007-present | Director-in-Chief, National Research Program for Genomic Medicine (A US\$30 millions national program) |
| 2009-present | President, The K-T Wang Bioorganic Chemistry Foundation |
| 2010 | President-elect, the Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB) |

Dr. Wang has following honors:

- 1987 Elected member, American Society for Biochemistry & Molecular Biology
- 1987 Fellow, American Institute of Chemists
- 1998 Fellow, American Association for the Advancement of Science
- 2000 Academician, Academia Sinica
- 2005 Fellow, The Third World Academy of Sciences (TWAS)
- 2007 Fellow, A-IMBN
- 2007 Science and Engineering Achievement Award, Taiwanese-American Foundation
- 2009 National Innovation and Invention Award, Ministry of Economic Affairs, Taiwan, ROC

台灣的科技研究政策與學術競爭力：以中央研究院為例

王惠鈞副院長

Academia Sinica

經濟發展是一國人民福祉提升的主要驅動力，學術研究則是國家發展之基礎及人文與科技進步的重要引導者。近年來全球科技研發競爭激烈，經濟優勢的主因從傳統的天然資源與資本，逐漸轉變成新知識的創造及應用。世界各先進國家及亞洲等國政府積極投注大量經費於高等教育與學術研究，並以高薪爭取國際學術科技研究人才，例如芬蘭及日本的研發經費在 2006 年就已超出 GDP 3%，中國大陸以年薪超過 10 萬美元聘請傑出學者，這股席捲而至的強烈競爭力不容輕忽。中央研究院(以下簡稱中研院)身為全國學術研究最高機關，負有從事學術研究、培養學術研究人才、指導聯絡及獎勵學術研究之任務，值此國際間學術研究與科技發展激烈競爭之際，檢視我國學術競爭力現況及未來努力方向，刻不容緩。

學術競爭力的衡量，一般常以論文發表的數目、期刊的影響力及論文被引用的次數來呈現；或以其應用性，如智慧財產權之保護和技術移轉的授權金，以及研究人員學術獎項與殊榮的獲得為依據。但培育優秀的人才及引導社會的發展也應是重要的指標。至於學術競爭力的提升，除了需要充足的研發經費及優質的研究人力外，還需要鬆綁不合時宜的法令，設計追求卓越的誘因機制，並且建立良好的基礎設施與國際化環境。

接下來我們以中研院資料為例，說明以論文發表、獎項與殊榮獲得、智慧財產權保護與技轉、人才培養及對社會影響等指標衡量的學術競爭力，並簡單分析現在的薪資結構、研究經費、研究環境基礎設施、研究人力與人才延攬，以及國際化程度等影響學術競爭力的關鍵因素。最後我們綜合各項分析，提出具體提升學術競爭力的相關建議。

Dr. Maw-Kuen Wu 吳茂昆博士

特聘研究員、院士兼任所長



- 1982-1984 美國休士頓大學物理系研究員
- 1984-1987 美國阿拉巴馬州大學物理系助教授
- 1987-1988 美國阿拉巴馬州大學物理系教授
- 1988-1994 美國哥倫比亞大學應用物理系教授
- 1989-1994 國立清華大學客座講座教授
- 1992-1995 (兼)國立清華大學材料科學中心主任
- 1994-迄今 國立清華大學物理系教授
- 1995-1998 國立清華大學教授兼研發會主任委員 b
- 2000-2002 行政院國家科學委員會副主任委員
- 2002-2004/5 中央研究院物理研究所所長
- 2002-2004/5 奈米國家型科技計畫總主持人
- 2004/5-2006/1 行政院國家科學委員會國科會主任委員
- 2006/1-迄今 奈米國家型科技計畫總主持人
- 2006/4-迄今 中央研究院物理研究所所長

- (1) 國際學術研究獎項 榮獲「艾托里馬約拉納-伊利斯-科學和平獎」
(Ettore Majorana-Erice-Science for Peace Prize 2007) 2009-02-06
- (2) 國際學術研究獎項 當選美國國家科學院海外院士(Elected Foreign Associate, US National Academy of Sciences) 2009-02-06
- (3) 國際學術研究獎項 Elected Member, Third World Academy of Sciences 2009-02-06

An Overview of the Nanotechnology Development in Taiwan

Dr. Maw-Kuen Wu 吳茂昆博士

Director, Institute of Physics, Academia Sinica
Director General, Taiwan National Nanotechnology Program

Taiwan has successfully evolved from an agricultural based economy to a well-developed high-tech based service economy within the past six decades. A key component for the success of this "Taiwan Miracle" is the diversity feature of the Taiwan. Taiwan is a small island with rich geology diversity, bio-diversity and cultural diversity. The hard working characteristics of the Taiwanese people plus the innovative government policies were the major driving forces to convert Taiwan.

In this presentation, I shall first give a brief review of the efforts during the past six decades for Taiwan's technology development. Then I'll present some details of our recent innovative development particularly on nanotechnology from both the fundamental and application viewpoints.

Dr. R.P.H. Chang 張邦衡博士



Dr. Chang is a Professor of Materials Science and Engineering, and the *Director, Materials Research Institute, National Education Center for nanotechnology*. His research areas include Nanoscale materials design, synthesis, and device fabrication as follows:

Carbon nanotubes: Recently we developed a technique whereby large quantities of nanotubes can be grown at high temperatures. These very high-quality nanotubes have been used to fabricate flat panel displays.

Photonic crystals: An exciting development has been the fabrication of a ZnO-based photonic crystal that can also lase. This work will lead to the integration of nanophotonic devices in the UV optical regime.

Random lasing phenomenon: In collaboration with colleagues in physics, we have succeeded in making the first observation of the random lasing effect in a ZnO powder layer. We have also made the world's smallest laser, a 1.5- micron ZnO particle cluster.

Quantum dots and wires: Work is in progress to synthesize and study quantum phenomena in quantum dots and nanowires of oxide-based materials.

Associations and Awards that Dr. Chang has are listed as follows:

- Councillor of the Materials Research Society (MRS)
- Principal editor, Journal of Materials Research
- Honorary member of the materials research societies of India, Japan, and Korea
- MRS Woody Award for outstanding service to the society, 1988
- MRS president, 1989
- Founding president, board of advisers, International Union of Materials Research Societies; chair, 1993–94
- Fellow, American Vacuum Society, 1994
- General secretary, International Union of Materials Research Societies, 1994–present

National Center for Learning and Teaching in Nanoscale Science (NCLT)

Dr. R.P.H. Chang 張邦衡博士

Director, NCLT, Northwestern University, 1801 N. Maple, Suite 2410, Evanston, IL 60201, USA. Email: r-chang@northwestern.edu

The National Center for Learning and Teaching in Nanoscale Science and Engineering (NCLT) was established in 2004 by the National Science Foundation with a mission to build US capacity in nanoscale science and engineering education (NSEE); enhance Science, Technology, Engineering, and Math (STEM) education; and help to meet the human resource development needs of the National Nanotechnology Initiative (NNI).

NCLT consists of world-class nano researchers and education experts and their students, working to quickly transfer the latest nanoscale science and engineering (NSE) research to US classrooms. Its unique program integrates learning and teaching research, instructional material development, professional development, and NSEE community building. The Center's website (www.nclt.us) provide teachers, students and college faculty with a variety of resources including courses, lectures, pre-college classroom modules, and learning technologies that enhance student understanding such as visualizations, animations, and games.

This talk will introduce the Center's activities and unique methodology, which incorporates the principles of inquiry and design, working partnerships with teachers, and cascade learning. Plans expanding national and global partnerships will also be discussed.



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駐亞特蘭大辦事處商務組為經濟部駐外單位之一，經濟部在此設立商務組的用意在於推動台灣與美國東南區各州及部分加勒比海國家之經貿關係，本組轄區包括：喬治亞州、阿拉巴馬州、佛羅里達州、北卡羅來納州、南卡羅來納州、肯塔基州、田納西州、波多黎各、美屬維京群島、海地、巴哈馬、百慕達、聖文森、格瑞納達、聖克里斯多福、多米尼克、聖路西亞等地。

本組負責推動台灣與轄區間之雙邊貿易、投資關係，提供廠商商情及投資資訊，並藉聯繫轄區政商界人士及參加商展、舉辦研討會等活動以促進雙方經貿往來。

廣告贊助：駐亞特蘭大台北經濟文化辦事處商務組

Ad-3

Science & Technology Session July 31, 2010

| | | |
|----------------|--|------------------------------------|
| Room A | A. Science and Technology Session (科技組) | Moderator: Dr. Ray Wang (王祥瑞博士) |
| 1:00 ~ 1:45 pm | 奈米技術在原子與分子科學上的應用: 'Listen' to the 'sound' of bacteria using light enhanced by nanoparticle 藉奈米粒強化光來聽取細菌之音 | Dr. Yuh-Lin Wang (王玉麟博士) |
| 1:45 ~ 2:30 pm | 奈米材料之應用: Nanoelectronics and Nanophotonics 奈米電子與奈米光器 | Dr. Yia-Chung Chang (張亞中博士) |
| 2:30 ~ 2:45 pm | Coffee break (休息) | |
| 2:45 ~ 3:30 pm | 奈米技術在醫學上之應用: Theranostic nanoparticles for targeted cancer therapy and imaging 奈米粒在腫瘤標靶診療之應用 | Dr. Lily Yang (楊莉博士) |
| 3:30 ~ 4:15 pm | 奈米技術於生物傳感器之應用: Particle Plasmon Resonance Biosensors 粒子電漿共振傳感器 | Dr. Lai-Kwan Chau (周禮君博士) |
| 4:15 ~ 5:00 pm | 奈米科技在農業上之應用: Nanotechnology Opportunities in Agriculture and Food to Address Grand Societal Challenges 以奈米術技在農業食物之機遇回應社會層的挑战 | Dr. Hongda Chen (陳宏達博士) |
| 5:00 ~ 5:45 pm | 奈米技術在食品安全系統之應用: Application of Nanotechnology in Food Safety System | Dr. Yao-wen Huang (黃耀文教授) |

Dr. Yuh-Lin Wang 王玉麟博士



Dr. Wang is Research Fellow & Director, Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan. He is also an Adjunct Professor, Department of Physics, National Taiwan University, Taipei, Taiwan; a Research Fellow, Institute of Atomic and Molecular Sciences, Academia Sinica,

Dr. Wang has following honors:

1. Far Eastern Y. Z. Hsu Chair Professor (2009)
2. Outstanding Scholar Award, Foundation for the Advancement of Outstanding Scholarship (2005-2010)
3. Outstanding Nanotechnology Research Paper Award, Far Eastern Y. Z. Hsu Science and Technology Memorial Foundation, Taiwan (2002)
4. Outstanding research award, National Science Council, Taiwan (1992)

Dr. Wang's main research interest is to explore the concept of 'constrained self-organization for the fabrication of nanostructures and naomaterials with novel physical, chemical or biological properties. For examples, the discovery of surface magic clusters and the creation of 2-d lattice of surface magic clusters were made possible because the underlying crystal surface provides the necessary constrain to gently affect the self-organization.

He is also interested in fabricating a nanomaterial that can eventually lead to a useful nanotechnology. I have been exploitation of Ag-nanoparticle arrays grown on anodica alumina templates for surface enhanced Raman spectroscopy (SERS). The novel optical property of this nanomaterial is the result of our ability to precisely control the size and spacing of the nanoparticles, which again is based on the concept of constrained self-organization. I'm taking advantage of the uniformly large enhancing power of the SERS substrate to identify bacteria and virus as well as their response to antibiotics. It is very likely this nanotechnology developed in my lab will be employed in the medical community in the near future.

'Listen' to the 'sound' of bacteria using light enhanced by nanoparticles

Dr. Yuh-Lin Wang 王玉麟博士

Institute of Atomic and Molecular Sciences, Academia Sinica
P. O. Box 23-166, Taipei, Taiwan 10617, R. O. C.
Tel: +886-(0)2-23668233, Fax: +886-(0)2-23620200, E-mail:
ylwang@pub.iams.sinica.edu.tw

Silver nanoparticles are grown on anodic aluminum oxide template to form substrates that exhibit extraordinarily large, uniform, and stable surface-enhanced Raman scattering (SERS) property. The successful preparation of such nanoparticle-array-substrates has dramatically improved the sensitivity and reproducibility of SERS and facilitated its applications in many fields including the detection and identification of a single bacterium. Since SERS provides vibration frequencies of molecules on the cell walls of bacteria, this spectroscopic method essentially allows us to 'listen' to the 'sound' of bacteria and use the 'timbre' to differentiate their types. The method also allows us to monitor the response of bacteria to antibiotic treatments, which is expected to provide valuable information for the development of new antibiotics.

Dr. Yia-Chung Chang 張堃中博士



Dr. Yia-Chung Chang joined the Physics Department, University of Illinois at Urbana-Champaign in 1980 as a visiting research assistant professor, and became an assistant professor in 1982, associate professor in 1986, and professor in 1991. In 2005, he joined Academia Sinica, Taiwan as a Distinguished Research Fellow and Director of the Research Center for Applied Sciences. Dr. Yia-Chung Chang's main research interests are in condensed matter theory, semiconductor electronics, photonic materials, and devices. In the last three decades he has worked on a series of related topics including shallow impurities and excitons in semiconductor superlattices and quantum wells, electronic and optical properties of semiconductors, surfaces and interfaces, and nanostructures, phonons and electron-phonon couplings in semiconductors and nanostructures, non-linear optical properties, many-body effects, exciton condensation, magnetic multilayers and giant magnetoresistance, photonic crystals, optical metrology, detectors, lasers, quantum transport properties of nanostructures, spintronics, and quantum computing. He is a fellow of American Physical Society and a ISI highly cited scientist. He has published over 260 papers in SCI journals.

Nanoelectronics and Nanophotonics

Dr. Yia-Chung Chang 張堃中博士

Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan 11529

In this talk, I will introduce ongoing research works at Research Center for Applied Sciences related to nanoelectronics and nanophotonics. Nanostructure materials and their applications, including nanostructure lasers, quantum dot infrared detectors, molecular transistors, quantum dot memory, optical nanometrology, and biosensors will be addressed. Both recent experimental studies and comparisons with theoretical modeling results are discussed.

Dr. Lily Yang 楊莉博士



Dr. Yang is Associate Professor of Surgery and Radiology and Nancy Panoz Chair of Surgery in Cancer Research in the Winship Cancer Institute at Emory University. Dr. Yang received her medical training in China at West China University of Medical Sciences and then in the Chinese Academy of Preventive Medicine. To pursue her passion in cancer research, she entered PhD program in Molecular and Cellular Biology Program at Brown University and studied the role of liver stem cells in the development of liver cancer. Dr. Yang has been working in the field of targeted cancer therapy since 1986. She has developed human monoclonal antibodies specific for breast or gastric cancer. As the Director of Preclinical Study in the Gene Therapy Laboratories at the University of Southern California, she worked on projects for the development of tumor targeted viral gene therapy vectors and new gene therapy approaches for the treatment of pancreatic and colon cancers. As a group leader for the anti-angiogenesis gene therapy at Aventis Pharma Gencell, she led preclinical studies on the delivery of adenoviral vectors producing a uPAR blocking ligand for the treatment of metastatic breast and colon cancers in animal tumor models. Dr. Yang also has extensive experience in generating orthotopic mouse tumor and human tumor xenograft models for breast and pancreatic cancers. Dr. Yang has been studying the role of the survivin in apoptosis resistance of breast, pancreatic, and colon cancer cells and targeting survivin for the development of cancer therapy since 1997. During the last six year years, Dr. Yang has been working on the development of multifunctional nanoparticles for targeted cancer imaging and therapy of pancreatic and breast cancers. Dr. Yang has filed several patent applications on novel nanotechnologies for cancer imaging and therapy. Dr. Yang is the member of NCI Emory-Gatech Cancer Center of Nanotechnology Excellence research team. Dr. Yang is the PI for NCI R01 research project aimed at the development of targeted nanoprobe for intraoperative optical imaging of breast cancer margins. She is the Project Co-Leader of the Nanotherapy research project in the Emory Head and Neck Cancer SPORE Program and the Co-PI for the research project on receptor targeted MRI for detection of breast cancer in the NCI Emory Molecular Imaging Center. Dr. Yang is the member of NIH Developmental Therapeutics Study Section (DT) and served as an Adhoc member in many other study sections. She has served as a scientist reviewer for several breast cancer research program reviewer panels, including the Department of Defense, Susan Komen Foundation and California Breast Cancer Research Program. Dr. Yang is the member of Editorial Board of Apoptosis and Breast Cancer-Targets and Therapy.

Theranostic nanoparticles for targeted cancer therapy and imaging

Dr. Lily Yang 楊莉博士

The development of novel agents with the combined diagnostic and therapeutic capabilities, defined as "Theranostics", holds great promise for improving the survival of cancer patients. Our group has developed a class of multifunctional magnetic iron oxide nanoparticles (IONP) with a uniform core size, high magnetization, and stable surface polymer coating. We have optimized bioconjugation protocols for targeting these IONPs to urokinase plasminogen activator receptor (uPAR) and epidermal growth factor receptor (EGFR), which are highly expressed receptors in breast and pancreatic cancer tissues. Our previous studies showed that the receptor-targeted IONPs are excellent imaging probes for MRI of orthotopic breast and pancreatic tumors in the mice. Addition of a near infrared dye to the receptor-targeted IONPs produces dual optical and MR imaging probes. We have demonstrated target specificity and *in vivo* tumor imaging of primary and metastatic tumors by MRI and optical imaging in several breast and pancreatic tumor animal models. In this study, we have produced targeted theranostic IONPs by encapsulating or conjugating several chemotherapy drugs to the amphiphilic polymer coating of the IONPs. These theranostic IONPs have a compact size (~30 nm) and high efficiency in drug loading. Systemic delivery of the uPAR-targeted theranostic IONPs carrying chemotherapy drugs significantly inhibited the growth of primary and metastatic tumors in orthotopic breast and pancreatic cancer animal models. Furthermore, intratumoral drug delivery and therapeutic response of the tumor can be monitored using MRI. Targeted delivery of chemotherapy drugs enhances the therapeutic effect in the drug resistant tumor cells while reduces systemic toxicity of the drug. Therefore, theranostic IONPs that combine biomarker targeted drug delivery and image-assisted treatment monitoring have potential to develop superior therapies for those cancer patients who are resistant to conventional chemotherapy and have a poor prognosis.

Dr. Lai-Kwan Chau 周禮君博士



Dr. Chau is a Professor, of the Department of Chemistry and Biochemistry, National Chung Cheng University, 2003~present. He is also the Director, Center for Nano Bio-Detection, National Chung Cheng University, 2008~present.

Dr. Chau has following positions:

- Research Consultant, Buddhist Dalin Tzu Chi General Hospital, 2005/3~2008/1.
- Member of the Editorial Board, *The Open Analytical Chemistry Journal*, 2007/3~present.
- Member of the Editorial Board, *Journal of Biomedical nanotechnology*, 2004~2006.
- Associate Professor, Department of Chemistry and Biochemistry, National Chung Cheng University, 1995-2003.
- Senior Fellow, Center for Bioengineering, University of Washington, 1994-95.
- Assistant Research Scientist, Department of Chemistry, University of Arizona, 1990-94.

He has 2008 Nano-Tech Award (Academic Group), Taiwan and 2009 Outstanding Research Award, National Chung Cheng University.

Dr. Chau's research areas include the following:

- Chemical sensors and biosensors
- Nanomaterials for chemical and biochemical analysis
- Photoelectrochemistry and solar energy conversion

Particle Plasmon Resonance Biosensors

Dr. Lai-Kwan Chau 周禮君博士

*Department of Chemistry and Biochemistry and Center for Nano Bio-Detection,
National Chung Cheng University, Chia-Yi, Taiwan*

chelkc@ccu.edu.edu

The field of commercial optical biosensors is rapidly evolving in order to develop simple, rapid, sensitive, and label-free detection schemes for the analysis of biomolecular interactions. Noble metal nanoparticles exhibit a characteristic absorption band in the absorption spectrum, which is referred to "Particle Plasmon Resonance, PPR" here. The characteristics of the PPR band such as peak wavelength and absorbance are highly sensitive to the local refractive index of the medium surrounding the noble metal nanoparticle and, hence, the binding event to the functionalized nanoparticle. The sensing sensitivity in term of peak wavelength shift can be increased by using noble metal nanoparticles of different shapes while the sensing sensitivity in term of absorbance or intensity change can be increased by lengthening the optical path using optical waveguides. Recently, we have employed gold nanorods [1] and gold nanoshells [2] to improve the sensing sensitivity in term of peak wavelength shift. In addition, we have developed a fiber optic-particle plasmon resonance (FO-PPR) biosensing platform to improve the sensing sensitivity in term of absorbance or intensity change [3,4]. The FO-PPR biosensing platform is sensitive to biomolecular binding events at the pico-molar level. As an example, the FO-PPR biosensing platform has been applied to quantitative measurement of antinuclear antibodies in sera from patients and healthy individuals, the results agree quantitatively with clinically accepted ELISA method [5]. Furthermore, we have demonstrated that the FO-PPR technology is more sensitive than ELISA, the gold standard in immunoassay, by at least an order of magnitude. The analysis time by the FO-PPR biosensing platform is significantly shorter (<15 min) as compared to ELISA.

Moreover, the PPR is responsible for the electromagnetic field enhancement that leads to surface-enhanced Raman scattering (SERS). Because of the narrow peak widths, SERS spectra of molecules adsorbed on noble metal nanoparticles have a great potential to be used as the barcodes for bio-detection. To further enhance the SERS signal, aggregation of noble metal nanoparticles is generally believed to be the major factor. Recently, we have developed a Raman barcoding scheme based on silica-coated, dye-tagged nanoaggregate of gold nanoparticles, called nanoaggregate-embedded beads (NAEBs). SERS signal from a single NAEB can be detected [6]. Bioconjugation of the beads can then be employed for bio-detection [7]. In summary, results from these applications show that exploitation of the PPR phenomenon is applicable to biosensing of real samples, including samples with clinically significant targets.

Dr. Hongda Chen 陳宏達博士



Dr. Chen is National Program Leader of Bioprocess Engineering and Nanotechnology, USDA/NIFA, December, 2000 – present. His experience is as follows: National Science and Technology Council (NSTC) subcommittee on Nanoscale Science, Engineering and Technology (NSET), 2001- present; Office of Science and Technology Policy (OSTP) and Council on Environmental Quality (CEQ), Nanotechnology Policy Coordination Group (NPCG), 2007 – 2009. Dr. Chen was Professor of Food Engineering, June 1, 1990 - December 2000, College of Agriculture and Life Sciences; and Graduate College, the University of Vermont.

Dr. Chen has following honors, awards, and other recognition within the profession:

- Top 50 Outstanding Alumni Award, the 50th Anniversary of Jiangnan University, China, November, 2008
- USDA Certificate of Merit for official annual performance appraisal rating of Outstanding (scored 8 out of possible 8), Five times (2002, 2003, 2005, 2007, and 2009); and Superior, Four times (2001, 2004, 2006, and 2008)
- NC-136 Multi-State Project, Certificate of Appreciation in recognition of his outstanding service as CSREES Representative from 2001 – 2005, October 2005
- Seven USDA, Certificate of Merit for various distinguished accomplishments, 2002 - 2009

Invited Keynote and Symposium Presentations, and Publications:

- More than 60 invited keynote and symposium speeches on nanotechnology for agriculture and food systems in the States and oversea since 2003.
- Contributing author to NSET Supplements to the President's NNI Fiscal Year Budget since 2002 to 2011.

Nanotechnology Opportunities in Agriculture and Food To Address Grand Societal Challenges

Dr. Hongda Chen 陳宏達博士

Nanotechnology research and development in the United States was initiated by the Federal government by forming National Nanotechnology Initiative (NNI) in 2001. The National Institutes of Food and Agriculture (NIFA), previously Cooperative State Research, Education and Extension Services (CSREES) of the U.S. Department of Agriculture (USDA), oversees extramural food and agriculture research, education, and outreach programs, and has been an active member of the NNI since 2002. A national strategic roadmap workshop was conducted in November 2002 to develop and articulate the visions and opportunities of nanoscale science, engineering and technology for agriculture and food systems in the new century[1]. Research and education in this scientific frontier has since been quickly established and expanded through the agency's programs and leadership, and in cooperation with research and educational institutes and partners throughout the country.

Nanotechnology research and development have experienced a rapid expansion and growth over the last decade, including those in the field of agriculture and food. Many new research projects not only aimed at providing novel solutions to the grand societal challenges including sustainability, vulnerability and human health, but also addressing other important issues such as environmental, health, safety, education, workforce training, public perception and acceptance. This presentation will provide an overview of nanoscale science, engineering and technology opportunities as related to agriculture and food systems. Examples of research may include nanotechnology applications in quality and value of food and non-food products; bio-sensors for monitoring plant disease and environmental stresses; sustainable and precise production; postharvest technology including waste management; detection and intervention technologies for enhancing food safety and agricultural biosecurity; and effective and safe delivery of bioactives in functional foods for improving human health and wellness. In addition, research to assess and analyze the perceptions and acceptance of nanotechnology applications in foods and nanotechnology-based products by the general public, agriculture producers and processing industries, and other stakeholders using appropriate social science tools will be presented.

[1] Scott, N.R. and H. Chen (2003). *Nanoscale Science and Engineering or Agriculture and Food Systems. Roadmap Report of National Planning Workshop. Washington D C. November 18-19, 2002.*
(<http://www.nseafs.cornell.edu/web.roadmap.pdf>).

Dr. Yao-wen Huang 黄耀文教授



Department of Food Science and Technology, University of Georgia
Athens, Georgia 30602, Huang188@gmail.com

Dr. Yao-wen Huang is a Professor of Food Safety and Microbiology, Department of Food Science and Technology, University of Georgia. He is also an Adjunct Professor of the Marine Sciences Department. Dr. Huang is a member of the UGA Center for Food Safety; Center for Infectious Disease; and Nanotechnology Science and Technology Center. He is a Certified New Product Development Professional (NPDP), PDMA; Certified Trainer, ServSafe Certification Program, NRA; Certified SSOP Trainer, Association for Food and Drug Officials (AFDOS); and a Certified HACCP Trainer, Association for Food and Drug Officials (AFDOS). Currently, he is a Consultant/ Visiting Professor: Shanghai Jiao Tong University, Shanghai Ocean University, Hainan University, Zhejiang Gongshan University, Shanxi Academy of Agricultural Science, JiMei University, Fujian Agriculture and Forestry University; National Taiwan Ocean University. Dr. Huang's research areas include Food Safety and Microbiology; application of nanotechnology on rapid pathogens detection; Asian functional foods; new product/process development. He teaches new food product development, seafood technology, introduction of food science and technology courses. He has published two books, more than 100 journal articles, 74 proceedings, 181 abstracts, 10 book chapters, 2 extension bulletins, 19 extension articles; 2 pending patents. As the President of *National Phi Tau Sigma*, The Honor Society for Food Science, Dr. Huang is also hold following positions: Vice President of The Monte Jade Science and Technology Association S.E.U.S.; Deputy Director, Editorial Committee, Food Technology, Chinese Institute Food Science and Technology; Board of Director, Atlanta Chinese Community Center; and Board of Director, Atlanta Federation of Chinese Community. Dr. Huang has honors and awards including elected as a Fellow of *the Institute of Food technologists (2009)*; Distinguished Teaching Award, *National Taiwan Ocean University (2008)*; Professional Achievement Award, *Institute of Food Technologists Southeastern Region and South Agriculture Society (1999)*; Outstanding Graduate Professor, *University of Georgia Food Science Club (1993, 1997)*; Outstanding Undergraduate Professor, *University of Georgia Food Science Club (1997)*; Distinguished Teacher Award, *Gamma Sigma Delta UGA Chapter (1996)*; and Certificate of Merit for Contribution to Minority Student, *University of Georgia Affiliated Program (1994)*.

Application of Nanotechnology in Food Safety System

Dr. Yao-wen Huang 黄耀文教授

Nanotechnology has been applied for many fields; however, it has gaining popularity in the area of food and agriculture. Today, food safety becomes an urgent and timely issue worldwide. The Risk-based approach is the way to ensure food safety. This system has three simple steps: to identify risks; to take action; and to measure results. In identifying risks, we must ensure a strong science base which is the foundation of any successful food safety system. Early and rapid detection of hazards will boost the food safety system. In this presentation, rapid detection technique for pathogenic bacteria and toxins using nanotechnology will be discussed.

Surface enhanced Raman spectroscopy offers considerable potential in the area of molecular identification and trace element analysis, which has significant applications in both biological and chemical analysis. A portable SERS probe which can be easily incorporated with a fiber Raman system was developed in our lab. We have determined that different bacteria have different SERS signature peaks, and those signature peak structures can serve as fingerprints to identify different bacteria type. However, the SERS signatures are mainly coming from the cell walls or other chemical components external to the cell; the orientation of bacteria on the surface, and their statistical distribution. Results identified the common Raman peaks from different bacteria. We further validated the ability of SERS to differentiate between viable and nonviable cells. To compare the SERS results with current detection technique, PCA experiments were also being performed to validate this technique. In addition, pesticides and melamine were used as target substance. Results have determined the characteristic Raman peaks of melamine in the spectral range from 500 cm^{-1} to 1800 cm^{-1} . Using two different sample preparation methods, the single droplet with varying melamine concentration and multi-droplet with fixed melamine concentration, and three prominent peaks at 498 cm^{-1} , 704 cm^{-1} , and 983 cm^{-1} , we have established quantitative relationship between the SERS peak intensities and the mass of melamine under detection. We have found that the limit of detection (LOD) is 2 pg, which corresponds to a bulk melamine concentration of 0.1 mg/L using single droplet varying concentration sample preparation method. There is linear relationship between the detecting melamine mass and the SERS peak area when melamine mass increases from 2 pg to 20 pg, and the upper limit of detection is 1000 pg. For pesticides, chlorpyrifos and parathion, they cannot be easily separated by GC method. However, they can be detected by using our SERS method. In summary, nanotechnology in food safety system will have a tremendous opportunity, yet a big challenge in the future.

Chu, H.-Y., Liu, Y., Huang, Y.-W. and Zhao, Y.-P. 2007. A high sensitive fiber SERS probe based on silver nanorod arrays. *Optical Express*. 15:12230-12239.

Chu, H.Y., Huang, Y.W., and Zhao, Y. 2008. Silver nanorod array as a SERS substrate for foodborne pathogenic bacteria detection. *Applied Spectroscopy*. 62(8): 922-931.

Du, X., Chu, S.-Y., Huang, Y.-W., and Zhao, Y. 2010. Qualitative and quantitative determination of melamine by surface-enhanced Raman spectroscopy with silver nanorod array substrates. *Applied Spectroscopy* 64(7)

Art & Literatures Session July 31, 2010

| | | |
|----------------|--|---------------------------------------|
| Room B | B. Art & Literatures Session (藝文組) | Moderator: Dr. Kevin Hsieh (謝國昱教授) |
| 1:00 ~ 1:50 pm | Elementary Education in Taiwan and the United States: An Art Teacher's Perspective 從一位國小美術教師的觀點來看臺灣與美國的國小教育 | Dr. Kevin Hsieh (謝國昱教授) |
| 1:50 ~ 3:00 pm | Demonstration of Chinese Bird & Flower Painting 中國花鳥畫示範 | Dr. Lee Jan Jan (詹歷堅教授) |
| 3:00 ~ 3:30 pm | Nanopicutre/Nanoart | Dr. Zhengwei Pan (潘正偉教授) |
| 3:30 ~ 3:40 pm | Coffee Break (休息) | |
| 3:40 ~ 4:30 pm | Compare Chinese and Western Traditional Painting 比較中國和西洋傳統畫 | Dr. Cecila Jan (席莉雅博士) |

Dr. Kevin Hsieh 謝國昱教授



Dr. Hsieh, an international scholar, joined the Art Education team at Georgia State University in 2008. His research and teaching interests are: interdisciplinary art education, Chinese art history, museum education, art administration, and the integration of both technology and visual art into education.

Before he joined the Ernest G. Welch School of Art and Design at the GSU, Dr. Hsieh was the coordinator of the Zoller Gallery at the School of Visual Arts, Penn State University. He curated more than twenty exhibitions at the Zoller, both domestically and internationally. In 2006, he worked as a research assistant under the Department of Eastern Asian Art at the Philadelphia Museum of Art. Before he came to the United States, he taught art as an elementary art teacher for six years at the Si-Wei Elementary School in Kaohsiung City. Dr. Hsieh received his Ph.D. in art education from the Pennsylvania State University in 2008, MFA in art history and BA in visual art education from National Ping-Tung University of Education in Taiwan. He was elected as the Director of Higher Education Division at the Georgia Art Education Association in 2009 and will serve for the terms of 2011 to 2012. He presented his research articles and papers both in the U.S. and oversea. His articles were published in couple research journals, such as *Museology Quarterly*, *Journal of Arts, Humanities and Social Sciences Research*, and *Journal of Liberal Arts and Social Sciences*.

Art Education in the United States and Taiwan: An Art Educator's Perspective

Dr. Kevin Hsieh 謝國昱教授

Assistant Professor of Art Education
Ernest G. Welch School of Art and Design
Georgia State University, Atlanta, GA

There are similarities and differences of educational system between the United States and Taiwan. The educational reform act has been executed for more than ten years in Taiwan. The United States' educational ideology plays an important part in Taiwanese's education reform during the 90s. There are changes in different disciplines, such as arts and humanity. This article compares these two different educational systems through an art teacher's perspective. There are four aspects discussed in this article: Teacher, Parents, Student, and Administration. Suggestions and recommendations are given in the end of this article.

Dr. Lee-jan Jan 詹歷堅教授

2205 Hog Liver Road
Carrollton, GA 30117-6801
770-834-2535
ljan@bellsouth.net
status: retired

Lee-jan Jan received his BA from National Chengchi University, and the MA and Ph.D. from the Florida State University. He taught Sociology at the Florida State University, Florida A&M University, Tunghai University, Shih Hsin University, and for 25 years at the University of West Georgia before retiring in 2003. He studied painting and calligraphy with Fu Chuan-fu, T'an Shu, and Chiang Shu-ch'ien, well-known masters in Taiwan. He has had many one-man shows, and participated in numerous group shows. His paintings are in many private and public collections.

中國花鳥畫示範

花鳥畫和山水畫一樣，最初都是人物或宗教畫的背景和點綴。直到晚唐、刁光胤和邊鸞等名家出現，花鳥畫才可說成為獨立畫題。

五代時宮庭的院畫家黃筌創造了雙勾，裝飾性濃的工筆重彩畫，因此又稱院畫。同時代的徐熙則建立了以點染為主的畫法稱為沒骨畫，因他在民間所以多野逸之趣。花鳥畫到此和人物、山水成為我國並列的三大畫門。

沒骨的點染畫法因受文人喜愛，遂漸漸凌駕工筆勾勒畫法。更重要的是蘇東坡，文同，揚無咎，及後來的鄭所南等創立了以水墨為主的文人畫，這種畫奠基了元朝的梅蘭竹菊四君子畫。到了明代，徐文長和陳道復倡大寫意水墨花鳥，大放異彩。清朝的揚州八怪，和民國初年的吳昌碩，齊白石，都承此一脈而發揚光大。

這次將對沒骨花鳥畫的用筆，用墨，用水，和用色略作闡示。

Dr. Zhengwei Pan 潘振偉教授



Dr. Pan is an assistant professor of Department of Physics and Astronomy, University of Georgia.

He has held following positions:

- 2005 - 2006 Research Staff Scientist, Center for Nanophase Materials Sciences & Chemical Science Division, Oak Ridge National Laboratory, Oak Ridge, TN.
- 2003 - 2005 Research Assistant Professor, Department of Materials Science and Engineering, University of Tennessee, Knoxville, TN.
- 2002 - 2003 Research Associate, Chemical Science Division, Oak Ridge National Laboratory, Oak Ridge, TN.
- 2000 - 2002 Research Associate, Department of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA.
- 1999 - 2000 Senior Research Associate, Department of Physics and Materials Science, City University of Hong Kong, Hong Kong, China
- 1997 -1999 Postdoctoral Research Fellow, Institute of Physics, Chinese Academy of Sciences, Beijing, China

Dr. Pan's research interests include follows:

- Synthesis of new nanowires by developing new synthetic approaches and new catalysts.
- Fabrication of functional multicomponent nanowire and nanobelts with new compositions, new lattice structures and new luminescent properties for white light LEDs and b
- Growth of carbon nanotubes and carbon nanotube-reinforced ceramic matrix composites for light-weight, high-strength and high-temperature applications.
- Development of novel, solar radiation-activated, near-infrared long-persistent phosphors for TTL (tagging, tracking and locating) in defense and security, *in vivo* optical imaging, and efficient solar photovoltaics.
- Synthesis of quantum dots and nanocrystals for biological labeling.

The Art of Nanoscience—NanoArt Education

Dr. Zhengwei Pan 潘振偉教授

Even though “Nano” has been a buzz word for about two decades, public opinion about nanotechnology is quite superficial and limited. Limited by their educational background, the education to general public and K-12 students about the movement of nanoscience and nanotechnology requires an appealing and attractive way. In this regard, NanoArt, a new art discipline at the intersection of Art, Science and Technology, appears to be a more appealing and effective way to bridge the gap between the educators and the general public. In this talk, I will introduce how to create appealing NanoArt and how to use NanoArt as an effective tool to educate general public and K-12 students on the movement of nanoscience and nanotechnology.

Dr. Cecilia O. Jan 席莉雅博士

2205 Hog Liver Road
Carrollton, GA 30117-6801
770-834-2535
status: retired

Cecilia O. Jan received her BA from the Florida State University, MA from the University of Hawaii, and the Ph.D. from the Florida State University. She taught Asian history, humanities, art history, and comparative aesthetic philosophy at Florida State, Tunghai University, LaGrange College, Berry College, the University of West Georgia, and the Atlanta College of Art.

The Didactic and the Sublime: Goals and Achievements of Chinese and American Landscape Painting

Dr. Cecilia O. Jan 席莉雅博士

This presentation will look at some of the similarities and differences in the aesthetic appreciation of landscape painting, Chinese and American, focusing on the painting of Fu Chuan-fu (1910-2007) and Asher B. Durand (1796-1886). The works of the two men are both the culmination of artistic traditions, and the individualistic response to the art and art-historical setting of their respective times. The works of both have integrity, harmony, and clarity of vision. A contemporary critic of Durand's time wrote "a great work of art is a delight and a lesson." By comparing and contrasting the two art traditions, we can gain a better appreciation of both.

Law Session July 31, 2010

| | | |
|----------------|--|--|
| Room B | C. Law Session (法律組) | Moderator: Li Kang Wang, J.D. (王立綱律師) |
| 4:30 ~ 5:00 pm | Nanotechnology Patent Law | Li Kang Wang, J.D. (王立綱律師) |
| 5:00 ~ 5:30 pm | Every-day Legal Issues with Running A Business in Georgia | John Wu, J.D. (吳志宏律師) |

Li Kan Wang, J.D. 王立綱律師



Li K. Wang is a registered patent attorney with experience in intellectual property matters. Prior to founding Wang Law Firm, Inc., Li worked at Carlton Fields (2004-2007), Arnall Golden Gregory (2002-2004), Bockhop & Reich (2002), Kilpatrick Stockton (2000-2001), and Womble Carlyle Sandridge and Rice (1999-2000). Li also worked as engineer for AT&T/Lucent Bell Laboratories (1986-1999).

Li has drafted and prosecuted patent applications in the area of telecommunications, network security, RFID, electronic power management, software systems, chemical processing, automotive parts, medical devices, hardwood flooring systems, and business methods. Besides drafting patent applications, Li also provides client counseling on intellectual property matters, such as patent/trademark infringement, domain name disputes, providing opinion letters, and design around ideas. In addition to patents, Li also helps clients to register their trademarks and police the marks against unauthorized usage.

Prior to practicing law, Li worked as engineer for prestigious AT&T/Lucent Bell Laboratories for 13 years. Li has worked on hardware design for mini computers, design of real time operating system for telephone switches, design of multimedia conference system for workstations, design of security for computer network, managed implementation of a PC-based product ordering system, and management of intellectual property portfolios.

Besides practicing law, Li dedicates his time serving Asian communities and low income families in the Atlanta area. Li's community involvement include elected in 2007 and 2008 as one of "25 Most Influential Asian Americans In Georgia" by Georgia Asian Times. Li is involved with following organizations: Monte-Jade Science and Technology Association – Chair (2007). Shu-Te University (Taiwan) – member of Board of Trustees (2006-2009). Brazilian American Chamber of Commerce – Board member (2004-2007). Taiwanese Chamber of Commerce – Director (2003-2007). Atlanta Asian Film Festival Inc. – Board member (2005-2007). Georgia Asian Pacific American Bar Association (GAPABA) – board member (2001-2003). Pro Bono attorney in the AVLF's Domestic Violence program (2003-2004). GAPABA's liaison to Catholic Social Services (2001- 2002). Pro Bono attorney with Catholic Social Services (2001-2002). Volunteer for Grand Parent Adoption Program (2000-2001). Instructor for People's Law School (2001-2003).

Intellectual Properties for Academics

Li Kan Wang, J.D. 王立綱律師

Patent Law

Academics and scientists contribute to the development of the society by developing new ideas and knowledge and sharing these new ideas and knowledge with their peers and the world. Some ideas are published as academic papers and other ideas result in patent applications. Both academic paper and patent are protected intellectual properties. When an academic paper can include information published by another academic paper? What does a patent protect? This IP Talk for Academics will discuss key points an academic professional or a scientist needs to know about copyright and patent.



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Ad-4

Medical Session August 1, 2010

| | | |
|---------------------------|--|--|
| 8:45 ~ 12:00 pm Room A | D. Medical Session (醫療組) Ocular Surface Disorders 眼球表面問題 | Moderator: Dr. Kuang-Yueh Chiang (江光悅醫師) |
| 8:45 ~ 9:15 am | Health Care Reform 健保政策改革 | Mr. Glenn Pearson |
| 9:15 ~ 10:00 am | Conjunctivochalasis and Amniotic Membrane Transplantation 結膜鬆弛症和羊膜移植 | Dr. Scheffer Tseng (曾垂拱醫師) |
| 10:00 ~ 10:45 am | Blepharitis Diagnosis and Treatment 眼瞼炎的治療和診斷 | Dr. Barry Lee |
| 10:45 ~ 11:30 am | Ocular Allergies and Dry Eye Syndrome 過敏性結膜炎和乾眼症 | Dr. Anna Kao (高士茵醫師) |
| 11:30 ~ 11:55 am | Panel Discussion | Dr. Kuang-Yueh Chiang (江光悅醫師) |
| 11:55 ~ 12:00 pm | Closing Ceremony | 陳英偉卸任會長、鄭義為新任副會長 |

Mr. Glenn Person, VP, Georgia Hospital Association



Glenn Pearson is Executive Vice President at Georgia Hospital Association in Marietta, Georgia. He is board certified in healthcare administration and is a fellow in the American College of Healthcare Executives. He provides leadership to the following areas at GHA:

- Financial Services (Medicare, Medicaid, commercial payers, etc.)
- Data Services
- Georgia Hospital Health Systems, Inc. (For-profit shared services subsidiary)
- Public Relations
- Computer Services and Information Technology

Among his major activities and accomplishments:

- Leading GHA's efforts to help hospitals qualify for additional funding under the American Recovery and Reinvestment Act of 2009 by partnering with Computer Sciences Corporation (CSC) to:
 - Create a group purchasing and implementation program for Eclipsys electronic medical records
 - Develop the GHHS Meaningful Use Guided Implementation Program
 - Offer workshops and consultancies
- Spearheaded GHA's efforts to investigate the advantages and disadvantages of recommending a provider tax to replace possible loss of Intergovernmental Transfers for the Disproportionate Share Hospital program
- Led the design, marketing and implementation of GHA's MV Managed Care Project, an innovative effort to obtain better information to help participating hospitals to

individually understand their position in the managed care marketplace and to independently develop long-term strategies for achieving financial goals within the parameters allowed under antitrust laws

- Greatly raised GHA's profile in the electronic communications arena by:
 - Being appointed founding president of Georgia Health Information Exchange, Georgia's statewide effort to develop a Regional Health Information Organization in Georgia.
 - Serving on the State of Georgia Health Information Technology and Transparency Board Ad Hoc Advisory Group
 - Leading GHA's efforts to help members prepare for HIPAA, including serving as a primary organizer of a local cross-industry coalition, serving as co-chair of a 13-state consortium developed by the Center for Medicare and Medicaid Services and Healthcare Resources Services Administration, and developing a number of shared services offerings for members

Prior to moving to GHA, he was Vice President of Data and Shared Services for the Hospital Council of Western Michigan in Grand Rapids. His acute care hospital experience includes positions at Providence Hospital in Southfield, Michigan, the University of Michigan Medical Center in Ann Arbor, and Ohio State University Hospital in Columbus. He earned a Masters of Health Administration degree from Ohio State University and is a Phi Beta Kappa graduate of the Syracuse University Honors Program.

Glenn is married to Annette, a middle school gifted sciences teacher and has two children: Andy, an assistant creative director for Crispin Porter & Bogusky ad agency in Boulder, Colorado, and Stephanie, a film production intern in Hollywood. Glenn is also a professional musician (blues/rock/bluegrass harmonica), an award-nominated published author and a cycling enthusiast.

Health Care Reform

健保政策改革

Mr. Glenn Person

VP, Georgia Hospital Association

Dr. Scheffer C. G. Tseng 曾垂拱醫師



Dr. Tseng is a physician scientist, received MD from National Taiwan University Medical School in 1978, and PhD from University of California San Francisco in 1981. He completed the ophthalmology residency at Johns Hopkins Hospital (1984) and the cornea and external disease fellowship at Massachusetts Eye & Ear Infirmary, Harvard Medical School (1986). He was Charlotte Breyer Rodgers chair professor at Bascom Palmer Eye Institute University of Miami School of Medicine (till 2002). He served as the first President of International Ocular Surface Society (2000 to 2004). He received Senior Achievement Award (2004, and Secretariat Award (2005) from American Academy of Ophthalmology, and is a ARVO Silver Fellow. He serves as an ad hoc member of several NIH study sections, and the editorial board of Ocular Surface Journal and Cornea Journal. Dr. Tseng is specialized in ocular surface diseases and reconstruction using new surgical techniques of epithelial stem cell transplantation and amniotic membrane transplantation. His research focuses on epithelial stem cell biology and tissue engineering based on the use of novel amniotic membrane matrix, and has been supported by NIH, National Eye Institute for over 25 years. He combines his expertise in clinical services, education and research, and has produced more than 260 papers in the field of ocular surface diseases and reconstruction, and trained more than 50 international fellows specialized in ocular surface diseases. Presently, He is the medical director of Ocular Surface Center and Ocular Surface Research & Education Foundation, and the Chief Scientific Officer of TissueTech, Inc., the leading tissue engineering company in Ophthalmology in USA.

Conjunctivochalasis (CCh) and Amniotic Membrane Transplantation

結膜鬆弛症和羊膜移植

Dr. Scheffer C. G. Tseng 曾垂拱醫師

- A common, but often overlooked problem that makes dry eye complex, confusing, and difficult to manage.
- Great for building or expanding surgical practices.
- Understand how to detect CCh and differentiate it from conventional dry eye.
- Know (indications) how to select and explain to the patients.
- AMT is a simple topical surgery with a high quality outcome.
- Superior limbic keratoconjunctivitis (SLK) is “Superior” CCh and can be similarly managed.
- Mention and manage other ocular surface deficits (ATD dry eye or MGD) afterwards.

Dr. William Barry Lee



CONTACT INFORMATION

Eye Consultants of Atlanta
3225 Cumberland Boulevard, Suite 900
Atlanta, GA 30339
404-351-2220 EXT 1216
Website: www.eyeconsultants.net

Piedmont Better Vision
3193 Howell Mill Road
Atlanta, GA 30327
404-350-1414
www.piedmontbettervision.com

Specialty: **Cornea, External Eye Diseases, & Refractive Surgery.**

Dr. Lee specializes in the management of cornea, external diseases of the eye and vision correction.

His areas of surgical expertise include cornea transplantation, ocular surface and stem cell surgery, cataract and refractive surgery.

Board Certified: American Board of Ophthalmology

Fellowship: Cornea, External Disease & Refractive Surgery
University of California, Davis Dept. of Ophthalmology
Sacramento, California
Preceptors: Mark J. Mannis, M.D.
Ivan R. Schwab, M.D.

Residency: University of Kentucky Medical Center,
Lexington, KY

Internship: Spartanburg Regional Medical Center

Spartanburg, SC

Medical School : University of Kentucky College of Medicine
Lexington, KY
Highest Distinction, 1998

Undergraduate: University of Kentucky
Biological Sciences, Chemistry,
Highest Distinction, 1994

Honors:



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- [Premier Surgeon 250 list](#), Ocular Surgery News / Slack
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Dr. Lee is one of only a few ophthalmologists in Georgia with fellowship training in corneal disorders, corneal transplantation, and modern refractive surgical procedures including LASIK, LASEK, and corrective lens surgery.

Blepharitis Diagnosis and Treatment

眼瞼炎的治療和診斷

Dr. William Barry Lee

Dr. Shih Yin Anna Kao 高士茵醫師



Dr. Kao is an ophthalmologist, P.A at the Emory Clark-Holder Clinic and at the West Georgia Health System, in Lagrange, GA. She held Alpha Omega Alpha Honor Medical Society Student Research Fellowship (1996) and Departmental Distinction in Microbiology, Bachelor of Science Degree, University of Illinois Champaign-Urbana (1992).

Dr. Kao currently is the President of the Georgia Society of Ophthalmology and was the President-Elect of the Georgia Society of Ophthalmology (2009), Vice-President of the Georgia Society of Ophthalmology (2008). She is the Member of the Georgia Society of Ophthalmology, Lions Club, American Society of Cataract and Refractive Surgery and American Academy of Ophthalmology

She has publications including Kao SA, Enzenauer RW, Horlander K: Exotropia-Pseudo. EMedicine, internet textbook. www.emedicine.com (1999) and Kao SA, Enzenauer RW, Horlander K: Esotropia-Pseudo. EMedicine, internet textbook. www.emedicine.com (1999)

Ocular Allergies and Dry Eye Syndrome

過敏性結膜炎和乾眼症

Dr. Shih Yin Anna Kao 高士茵醫師

Ocular allergies are on the rise due to climates changes around the globe as well as other factors. To understand ocular allergies, the presentation begins briefly by covering the general anatomy of the eye. Focusing mainly on Type I hypersensitivity reaction of immunologic response of conjunctiva and cornea, different subcategories are to be discussed in the talk. Discussion includes causes, clinical signs and symptoms of the different types of ocular allergies. Dry eye syndrome, which has been known to be a result of inflammatory processes of conjunctiva, is to be discussed along side of ocular allergies. Finally, the presentation concludes with the current treatment plan and options for ocular allergies.

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門診時間：週一，二，三，五，上午10時至下午3時。煩請事先電話預約。



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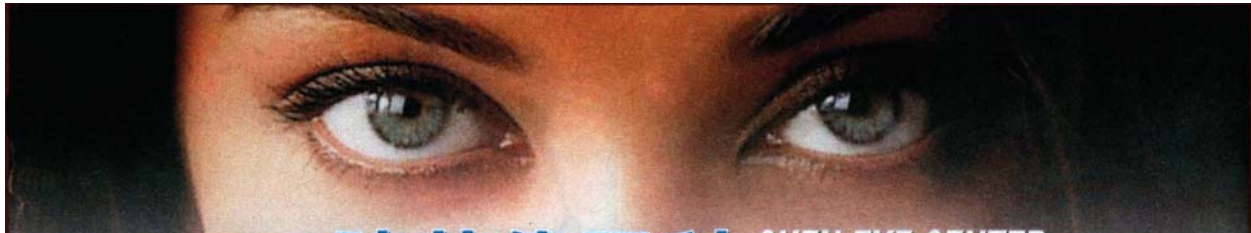


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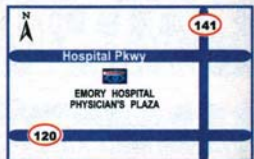
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