



Photonic Link

Publications of *Photonic Society of Chinese-Americans*

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since 1990.

1. The objectives of Photonic Society of Chinese-Americans (PSC)

The objectives of PSC are to promote friendship and collaborations among Chinese-American engineers and scientists in the field of photonics so that they can enhance their professional and business contributions for better quality of life in this fast changing world.

2005 to 2006 PSC executive officers

President: Dr. Yan Yin, YY Labs, Inc. yanyin@yylabs.com

First Vice President: Dr. Yung S. Liu, ITRI, Taiwan, liuys@itri.org.tw

Second Vice President: Dr. Ming C Wu, UCLA, CA, wu@ee.ucla.edu

Treasurer: Dr. Janice Shen, Jet Propulsion Lab, CA, Janice.shen@jpl.nasa.gov

Executive Secretary: Jane Xiao, janexiao@aol.com

Advisory Board Members:

Dr. Milton Chang, Dr. H.K.Liu, Dr. R.L.Chao, Dr. Haifeng Li, Dr. Pochi Yeh, Dr. Arthur Chiou, Dr. C.C.Shih, Dr. Tingye Li, Dr. Shi-Kay Yao, Dr. Jane Yang, Dr. Gordon Li, Dr. R.S. Liu, Dr. Peter Shih, Ms. Pamela Hsiao

2. President's Message

Congratulations to the new era of Photonics Link!

Photonics Link has entered its 16th year as a loyal friend of our Photonic Society of Chinese Americans (PSC) by recording and reporting important events, activities, and major policies, reflecting not only the history of PCS, but also the history of the broad Photonics industry ocean from the point of view of a small society-island. Therefore, Photonics Link has its weight and meaning. It is worth the efforts of all of our members to develop it, let our good friend grow stronger.

I am very pleased to introduce our new Editor Jenny Colegrove to our members. Dr. Jenny Colegrove was graduated from Beijing University, and received her Ph.D. from Kent State University, Ohio. She currently works for Intel Corporation. Her enthusiastic and serious working attitude is precious for our Photonics Link. With our members support, I am confident that the Photonics Link will be a good friend of our every member, and it will be a tool to link our members.

Photonics Link will continual to be published 4 times per year, that is: August, November, February, and May. In Photonics Link, we will not only report events, but also publish good editorial articles. We welcome articles contributed from our members. We will post the Photonics Link on our website for members to read.

Dear members, please submit your articles, comments, and wishes to Jenny Colegrove. Her E-mail address is:jennycolegrove@yahoo.com.

Thanks,

Yan Yin
2005 President of PSC

3. Report on Joint Workshop of PSC and SPIE Taiwan Chapter at SPIE Optics and Photonics Symposium in San Diego

Yan Yin and Ding Ping Tsai

SPIE (The International Society for Optical Engineering) had its 50th anniversary Optics and Photonics Symposium held from July 31 to August 5 in San Diego. As a part of this symposium, US Photonics Society of Chinese Americans (PSC) and SPIE Taiwan Chapter held a joint workshop on July 31, 2005 in room 7B of San Diego Conference Center. The program of Joint Workshop was listed in Advanced Program of the SPIE, as shown at the end of this report.

Four invited speakers from PSC and four invited speakers from Taiwan have given their speeches in this Joint Workshop. Invited speakers such as Dr. Jianpu Ho, Dr. Rong Hsu and Dr. Gordon Li, Prof. Arthur E. T. Chiou and Prof. Din Ping Tsai made a special trip to San Diego to give their speeches. Two invited speakers, Dr. Songling Zhuang and Prof. Ci-Ling Pan, could not attend this Joint Workshop because of certain unforeseen business reasons. However, Professor Zhaoqi Wang (NaiKai University, Tianjing) and Professor Ken Y. Hsu (National Chiao Tung University, Hsinchu) have delivered their invited talks for Dr. Songling Zhuang and Prof. Ci-Ling Pan, respectively. Dr. Yongsheng Liu (ITRI, Taiwan) also could not attend the Joint Workshop to give his invited talk in personal, but he prepared an excellent pre-recorded audio-video-talk slide file to play at the Joint workshop. All the eight invited talks were very informative, educational and well done. Current status of photonics industries and research institutes were reported. A discussion session after all the invited talks provided thoughts and comments on several important concerns on the current developments and future projections in certain issues of photonics industries.



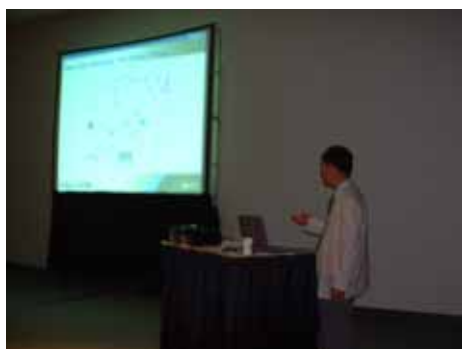
Figure 1: Speakers: from Left to right: Jianpu Ho, Gordon Li, Professor Arthur E.T. Chiou, Professor Dingping Tsai, Yan Yin (PSC 2006 President), Dr. Rong Hsu, and Prof. Ken Y Hsu.

Dr. Jianpu Ho is President of Fiber Optical Communications, Inc. (FOCI), which is located in Shanghai. The company has been quite successful in China. It has already had about 500 employees, and is able to break even, established business relationship with Huawei and some other several major communication companies in China. China has great potentials, but also is risky, one needs to know how to run business there, and this is not easy. There was a question for Dr. Ho: “Do you think the booming time of year 2000 for fiber optics will come back again?” Dr. Ho smiled: probably not. Yes, the history never repeated itself. Fiber optics will still grow and

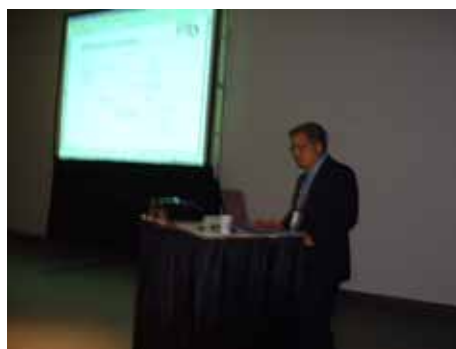
develop, but will do it with different way. The bandwidth is still expanding, internet phone, and some other business is emerging. We need to find new opportunities. Just remember, there was no road until you walk.

Dr. Rong Hsu, president of ELCOS, introduced the important development and competition in micro-display industry. The new technology ELCOS has proved itself from technology point of view, and has managed to establish business relationship with JDSU and several other major players. We sincerely hope that ELCOS will be developed next year, and then we will hear more good news from Dr. Hsu.

Dr. Gordon Li, VP of OE Devices, Luminent OIC, Inc. discussed the current developments in photodiode industry, such as pin diodes and avalanche photo-detectors, etc for application of FTTP. Luminent OIC, Inc. is now located in Chatsworth, CA and Hsinchu, Taiwan.



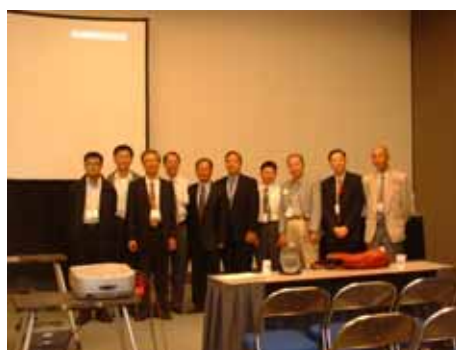
Dr. Gordon Li



Dr. Rong Hsu



Dr. Arthur Chiou



Speakers and Some attendees

Prof. Arthur E. T. Chiou, Dean of Medical Technology and Engineering, and Professor of Institute of Biophotonics Engineering, National Yang Ming University. He presented a review of current research and development of biophotonics and advanced educational programs at National Yang Ming University.

Professor Ken Y. Hsu of Dept. of Photonics, National Chiao Tung University, Taiwan delivered an invited talk for Prof. Ci-Ling Pan on an overview of photonics programs National Chiao Tung University. He also encourages the application for the faculty position in National Chiao Tung University.

Dr. Yung S. Liu, Director of Opto-Electronics & Systems Labs., Industrial Technology of Research Institute, and Taiwan presented a very interesting talk on the recent development of the optoelectronics industry in Taiwan. Lots of the up-to-date activities of photonics industry are reported in his talk. The market value and share of Taiwan's photonics industry attracted much of the attention of audience of Joint workshop.

Professor Zhaoqi Wang gave the speech on behalf of Dr. Songling Zhuang, who unfortunately could not come for the workshop. The speech was based on material organized by Professor Daheng Wang, fellow of Chinese Science Academy. The speech covered very broad area, from laser radar ranger to thermal imaging, from laser fusion to space shuttle "Shenguang I." Each slide can be a good topic of two-hour speech. We hope to have a chance to select several slides of this talk, and listen to more detailed introduction of them.

Prof. Din Ping Tsai of Dept. of Physics, National Taiwan University talked about the advanced developments of optical disk storage. New research on the ultrahigh density optical disk storage using near-field optics and nanophotonics has been reported in his talk.

In general, the topics and contents of this Joint Workshop included all the major important topics of photonics, such as optical communication (fiber to the home), flat panel display, OE components, remote sensing, biophotonics, optical storage, nanophotonics and photonics educational programs.

We understand that some members could not come. We hope that this short report can provide some of the information of this Joint Workshop to those who cannot attend.

4. Joint Workshop Program List

SPIE advanced program on Website of SPIE:

Joint Workshop of Photonics Society of Chinese Americans and SPIE Taiwan Chapter
Sunday 31 July 1:30 to 4:00 pm

The Photonics Society of Chinese Americans and the SPIE Taiwan Chapter invite you to participate in a joint workshop featuring the following speakers.

Dr. Janpu Hou, President of FOCL, Fiber Optical Communication, Inc.

Topic: Business and Technology Challenge for FTTx in China

Dr. Rong Hsu, President of ELCOS

Topic: Trend and Development of Micro-display

Dr. Gordon Li, VP of OE Devices, Luminent OIC, Inc.

Topic: OE Components for FTTP

Prof. Arthur E. T. Chiou, Institute of Biophotonics Engineering, National Yang Ming Univ.

Topic: Biophotonics R&D and Educational Programs at NYMU

Prof. Ci-Ling Pan, Dept. of Photonics, National Chiao Tung Univ.

Topic: An Overview of NCTU Photonics Programs

Dr. Yung S. Liu, Opto-Electronics & Systems Labs. Industrial Technology of Research Institute

Topic: Recent development of the optoelectronics industry in Taiwan

Dr. Songling Zhuang, China Instrumentation and Control Society, Chairman of Board, Director of Shanghai Optical Instrument Institute

Topic: 30 Years of Chinese optics

Prof. Din Ping Tsai, Dept. of Physics, National Taiwan Univ.

Topic: Developments of Advanced Optical Storage

The meeting was at San Diego Convention Center room 7B.

5. PSC 2006 annual conference Local committee review:

Yin Yan

The following speakers have confirmed their acceptations to our invitation:

Dr. Ping Xie, VP of Engineering from NeoPhotonics

Dr. Feijun Song , executive VP and CTO of China Daheng Group

Prof. Claire Gu, University of California, Santa Cruz, Department of Electrical Engineering

Prof. Bai Xu, University of Albany/Sunny, State University of New York (biophysics)

Mr. Thom Holder, Manager of display investment, Intel capital.

The local committee is still working on other issues, such as raising funds, and organizing job fair.

6. PSC-EOA seminar information (June-August, 2005)

Yalan Mao, EOA board member

- **June Seminar**

Speaker: Dr. Jennifer Kong Colegrove

Title: From LCD to AMOLED, the overview of portable display device.

Time: 10:00 am to 12:00 noon, Saturday, June 11, 2005

Place: Stanford University, CIS Building, Cypress room.

Abstract:

Display consumes a big percentage of the total power of a portable device, such as cell phone, PDA, e-book, notebook computer. To extend the mobility, we must understand displays. In my tutorial, I will generally introduce the types of display that are used in portable devices and their principles, such as PM LCD, AM LCD, reflective LCD, transmissive LCD, transflective LCD, PM OLED, AMOLED, bi-stable displays. I will also talk about the latest development in each kind display.

Speaker's Bio:

Jennifer Kong Colegrove is currently a Senior Display Engineer in Mobile Platforms Group in Intel Corporation. Before Intel, she worked for Silicon Bandwidth as R&D Engineer, worked for Digilens as Senior Material Engineer, worked for dpiX-Xerox as a consultant. She received her Ph.D. from Liquid Crystal Institute at Kent State University, Ohio in 2000. She got both B.S. and M.S degree from Beijing University in China, in 1992 and 1995 respectively. She has about 15 publications, 1 granted patent and 4 patent applications.

- **July Seminar**

Speaker: Dr. Claire Gu, Department of Electrical Engineering, University of California, Santa Cruz, CA 95064, USA.

Title: Ultra-sensitive Compact Fiber Raman Sensor Based on Surface Enhanced Raman Scattering

Time: 2005-0709, 10:00 am to 12:00 am

Place: CIS Building, Cypress Room. Stanford University

Abstract:

The demand for sensors for detecting chemical and biological agents is greater than ever before, including medical, environmental, food safety, military, and security applications. At present, most detection or sensing techniques tend to be either non-molecular specific, bulky, expensive, relatively inaccurate, or unable to provide real time data. Clearly, alternative sensing technologies are urgently needed. Recently, we have been working on a novel sensor based on nanoparticle surface enhanced Raman scattering (SERS) and D-shaped fibers for chemical, biological, and environmental detection. The sensor will be highly sensitive, molecular specific, reliable, label-free, non-invasive, inexpensive, easy to produce commercially using existing technologies, compatible with existing lasers and detectors, and applicable to a large number of molecules of interest. This is made possible by the unique sensor architecture based on a combination of D-shaped fibers and novel SERS substrates, where SERS provides the high sensitivity (10⁶-10¹⁵ enhancement factor), molecular specificity, and applicability to a wide range of compounds, while the novel D-shaped fiber provides the flexibility, compactness, reliability, low cost, and ease of production.

Speaker's Bio:

Claire Gu received her Ph.D. in Physics from Caltech in 1989. Then she worked as a member of the technical staff at Rockwell Science Center, and went to Penn State in 1992 as an assistant professor. In 1997, she came to UC Santa Cruz as the first Electrical Engineering faculty member, and is now a professor in EE. Her research interests include fiber optics, holographic data storage, liquid crystal displays, nonlinear optics, and optical information processing; with a current emphasis on fiber sensors using SERS (surface enhanced Raman scattering). She has published more than 160 journal and conference papers in these areas. In addition, she has co-authored a text/reference book on "Optics of Liquid Crystal Displays", and co-edited two technical books on photorefractive nonlinear optics and applications. She received a National Science Foundation Young Investigator Award in 1993. Since 2000, she has been a Topical Editor of Optics Letters.

• **August Seminar**

EOA Annual Picnic Announcement and August Seminar Announcement. EOA Annual Picnic is right after EOA August Seminar.

Speaker: Dr. Charles Ma (馬光浩博士), Chief Scientist of Phalanx Biotech Group

Title: Image Analysis in Biology-from Green Florescent Protein to DNA
Microarray

Time: August 13, 2005, 10:00 AM -12:00 Noon.

Place: Stanford University, CIS Building, Cypress Room

Abstract:

Visualization of results has always been an important aspect of experimental design in biology. In the last decade or so, a variety of advancements were made to broaden the applications of image-based analysis in the investigation of biological phenomena. In my talk, I will focus on two major tools - green fluorescent protein and DNA microarray. Green fluorescent protein (GFP) and its derivatives are self-fluorescent proteins that can be engineered to study cells and organelles in vivo (i.e. under normal living conditions). DNA microarray is a set of probes, ranging from hundreds to many thousands, immobilized on a solid surface that allows the researcher to study the global gene expression pattern of a biological system. These probes are often visualized using fluorescent dyes that could be coupled to nucleotides and high-resolution scanners equipped with lasers for proper excitation. For both GFP and microarray, a broad range of applications have been developed and the challenge for the future is to improve the analytical instruments (both the hardware as well as the software parts) that will enable them to reach their full potential in answering important biological questions.

Speaker's Bio:

Dr. Charles Ma (馬光浩博士) is currently the Chief Scientist of Phalanx Biotech Group. He received his Ph.D. degree in Molecular Biology from the University of California, Los Angeles (UCLA) and was a postdoctoral fellow in the laboratory of Dr. Martin Chalfie, the co-discoverer of Green Fluorescence Protein (GFP), at Columbia University. His postdoctoral research involved studying synapse formation in the nematode *C. elegans* using RNAi, co-developing novel method to culture *C. elegans* neurons in vitro and to identify targets of transcription factors using microarray analyses, co-modifying and expanding the method to linearly amplify RNA samples for DNA microarray analyses. Dr. Ma has been a recipient of numerous honors and awards, including University Fellowship at UCLA, Muscular Dystrophy Association Fellowship, NIH Postdoctoral Fellowship, and many other accomplishments. In addition, Dr. Ma has also been the co-inventor of several patents. The most recent one involves the use of reconstituted GFP (recGFP) as marker for biological applications.

7. Review of EOA August Meeting

Haijun Yuan

At EOA August meeting, Dr. Luke Chen, the Vice President of Marketing for Phalanx, gave us a presentation on DNA Micro-array technology. It was such a successful education that has not only given us optical engineers/researchers an extended view into the Biotech field but also triggered broad discussions of innovative ideas on optical applications in this field.

We have known the importance of genes in our human body, but before the presentation I did not realize the amazing reality that all of our biological information in genes is coded by only four nitrogenous bases: Adenine (A), Cytosine (C), Guanine (G) and Thymine (T). The DNA forms by double helix strings. One is coded by above bases, and the other is its counter copy, they link to each other in the way that C bond to G, and A bond to T. the two strings can be separated and regrouped under certain conditions that enable the reproduction of DNA.

Artificially synthesized gene chunks with codes of A, C, G, T bases form gene probes. Thousands of probes aligned on a substrate form a DNA micro-array chip, which has been made by Phalanx and other companies. How many genes do human have? 30k~50k. Nowadays DNA micro-array technology allows us to put 30k~50k different types of artificial gene probes on a 16mm×50mm chip, just a finger size chip that includes almost all of our human's biological information. With this chip, people can monitor gene express to diagnose diseases, develop drugs and even support researches such as to keep woman young forever and obtain meat from plants. How to monitor the gene express? People always can create simple and useful idea. Two groups of DNA tissue samples are prepared in single string phase first, usually, one is normal and the other is diseased or treated. They are then dyed by cy3 or cy5 respectively, and mixed together by an even ratio. The sample mixture then is dropped on the chip. The single strings of DNA chunks in the sample will then be bond to probes. According to the color distribution in different gene probe after DNA regrouping, the gene express information is obtained.

The DNA micro-array technology has already been popularly used worldwide. The market of the micro-array chip is very promising and exciting. Dr. Chen has shown us the estimates that the market was \$738 millions for 2003, \$952 millions for 2005 and will reach 1 billion in 2007. Once a micro-array chip is designed, the fabrication is formalized and repeatable, but the chip is consumable. It has to be thrown away.

That is why the market is to certain degree predictable and sustainable.

Phalanx has a unique technology that enables continuous printing of probes to improve the production efficiency and yield. As a smaller company, they have to work hard with their technologies to compete with giant such as Affimatrix, GE and Agilent. We wish them good luck and a great success.

Now how can we contribute in this exciting field as optical experts? That is a question we should think, And we should think loudly. Thoughts become words, and words become actions. And no great results were achieved without actions.

8. PSC-EOA September seminar announcement

Yalan Mao

Speaker: Dr. Cheng-chung Shih, CEO/President, Capella Microsystems Inc.

Title: Optical Electronic Application in your daily life

Time: September 10, 2005; 10:00am - 12:00 noon

Place: Stanford University, CIS Building, Cypress Room.

Abstract:

The light revolution has brought many optical electronic applications into our daily life. From telecommunication at 10Gbit and WDM to traffic light in every intersection, we have seen more and more optical electronic technology been implemented all over the places. The trick of optical technology and where the industry is moving forward will be discussed.

Speaker Bio:

Cheng-chung Shih is the CEO/President of Capella Microsystems Inc. Capella Microsystems is a fables Analog IC design company specialized in fully integrated optical sensor for highly portable optical storage and communication devices.

Dr. Shih possesses a Ph.D. and M.S.E.E. from the University of California at Berkeley as well as a B.S.E.E. in Communications Engineering, from the National Chiao-Tung University in Hsin-Tsu, Taiwan. Cheng-chung was the founder and CEO/President of Allayer Communications, which was found in 1997 to deliver high bandwidth network silicon solutions to enable All Layers of Internet Communications. Allayer generated revenue in its first year and having revenue yearly run rate at 20 million in 2000. At the end of 2000, Allayer communication merged with Broadcom at the end of 2000 for market value of 300 million dollars. Within Broadcom, Cheng-chung was the Managing Director of Broadcom Asia Design Centers. Before Allayer communication, he served in Allied Telesyn, LevelOne Communications, Rockwell Semiconductor. Dr. Shih is an expert in CMOS and mixed-signal digital/analog ASIC design as well as communication standards and systems. Since 1992, he has served on the IEEE 802.3 Ethernet Standards Committee. He holds 12 communications technology patents. He is also the 2005 Chairman of Monte Jade West Science and Technology Association.

Please mark your calendar and hope to see you all there.

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