



Asia Science Letter



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The Asia Science Letter is a bi-monthly publication of the Asian Office of Aerospace Research and Development (AOARD), Detachment 2 of the US Air Force Office of Scientific Research (AFOSR), the basic research manager of the Air Force Research Laboratory (AFRL). Its purpose is to inform the Air Force S&T community on the research and development activities in Asia and Pacific Rim countries including India and Australia. The assessments in this periodical are solely those of the authors and do not necessarily reflect official US Government, US Air Force, or AFOSR positions.

Highlights

As you probably noticed from our last ASL, AOARD is experiencing a large turnover in its Program Managers. Dr. White and Dr. Kim both departed in December.

Dr. Brett Pokines returns to AOARD in March to spend six months under the Intergovernmental Personnel Transfer Act (IPA) from Rochester Institute of Technology. Brett, an Assistant Professor of Mechanical Engineering, covers nanotechnology and Microsystems.

Lt Col John E. Brewer, a bioenvironmental engineer in the US Air Force Reserves, recently joined AOARD and will represent AOARD in Singapore. He has a BS & MS in electrical engineering with specialty in antenna design. He has over twenty years of experience evaluating antenna systems, radars, communication systems, satellite electronic warfare systems, and radiation hazards. In civilian life he is technical director of Trans World Radio, Asia Pacific Region, where he is responsible for the technical direction of 12 recording studios and a high power short-wave transmission site. Lt Col Brewer will work out of the Office of Defense Cooperation (ODC), U.S. Embassy, Singapore. He will specialize in the technical areas of Biotechnology and RF Bioeffects, and assist with other AOARD and ODC projects in Singapore.

AOARD will very much miss Dr. Jacquelin Hawkins who is leaving in February for the Wing Plans Office at Keesler AFB. Her wide-ranging duties included administration, personnel, and finance. She orchestrated the Tri-service renovation and move into a new facility, streamlined AOARD's budgeting and forecasting, and implemented a database system for all of AOARD's contracts.

Dr. Hawkins has been replaced by Mr. Julian Jaime, who reported 13 Feb 01, as the AOARD Administrative Officer. Mr. Jaime is coming to AOARD from the 35th Civil Engineer Squadron, Misawa Air Base Japan, where he is currently an Industrial Engineering Technician. Mr. Jaime's twenty-three year career in Civil Service has been varied and will make him a definite asset to AOARD. He has served as an Administrator, Analyst, Resource Advisor, and Manpower Specialist.

Terence Lyons

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Features

Information Technology in Japan

On 6 January 2001 Japan's Basic Law on Information Technology (IT) came into effect with the goal of creating an atmosphere conducive to electronic commerce by making Japanese citizens proficient in IT. The 2001 budget request includes 100 billion yen (almost \$1 billion). Specific priorities include expansion of the ultra-high speed network and implementation of "electronic government". Other changes include starting of a "NASDAQ Japan" and "Mothers" which is a section of the Tokyo Stock Exchange for small companies. Japan's stated goal is to become the world leader in IT in 5 years.

Some obstacles to the creation of IT start-ups, however, have not yet been addressed. These include some legal restrictions on stock options, unfavorable tax laws, and de-regulation of telecommunications. But some things have changed for the better. There has been, and will continue to be, considerable stimulation of underlying markets for IT goods, creating a better business climate for entrepreneurial success. Venture capital is changing and "Independent Venture Companies" are being formed (IVCs combine private investor money with bank money). In encouraging universities to become "engines" of ideas flowing to start-ups, there has been some progress; but major universities such as The University of Tokyo and Kyoto University, are still very conservative. Hokkaido University graduates have been successful in starting up several IT-related ventures including BUG, Hudson Co., etc. In the past year the number of DSL connections to Internet has risen greatly. Also, the number of mobile telephones (including NTT's iMode) has increased greatly. (Feigenbaum & Lyons)

Robotic Research Trends in Japan

Japan's robot industry has become a major worldwide business. By 2000, more than 400,000 industrial robots of 740,000 in use worldwide have been installed in Japan.

Industrial robots helped drive the Japanese productivity revolution of the 1980's and 90's. Now a mature technology, the industry is ready for innovations to bring about the next revolution. Two strategies under consideration for the 21st century robot business are advanced information intelligent systems and solution business systems. A big change has been the development of service robot from companies outside manufacturing equipment industry. Honda Motor Co. unveiled a revolutionary prototype humanoid robot (P3) in 1997 and Sony Corp. began marketing a pet robot (AIBO) in 2000. Since then, research institutes and private sectors have released various kinds of entertainment robots. However technology problems remain unsolved. Robots are a system of integrated elementary technologies which must coexist with humankind both at home

and workplace. Safety, flexibility and durability, essential features for practical robots, are being supported by current R&D investigations into flexible skeleton materials, new manufacturing technologies and artificial intelligence.

In 1998, New Energy and Industrial Technology Development Organization (NEDO) and Ministry of Economy, Trade and Industry (METI) established a 5 year national Humanoid Robotics Project (HRP) with the aim of developing a robot system to compliment and coexist with humankind. In this system, humanoid robots can be operated with aid of remote control using communication network and execute complex working and flexible movement over diverse terrain. In the initial half of the project, a humanoid robot platform, remote control platform, and virtual robot platform were developed. The latter half envisions developing applications such as plant maintenance, service communication with humans, home assistance, disaster countermeasures, and entertainment.

In addition, ROBODEX2000 (Partner Robot Fair) exhibited several other service robots now under development. They include:

- PINO and SIG - Dr. Kitano of Sony Corp. is heading the government project known as the Kitano Symbiotic System Project which is supported by the Japan Science and Technology Corporation. Dr Kitano announced two kinds of humanoid robots. PINO is equipped with 26 arthrodes and can run freely distinguishing the colors red, blue and yellow. SIG is united functionally with vision, hearing and motion. Their final objective is a Robocup-Rescue System. Such advanced disaster relief system will be made by integration of computer science, artificial intelligence and robot engineering. The goal is development of a robust infrastructure for large-scale disasters by 2050.
- Robovie - A new robot developed at the Advanced Telecommunication Research Institute (ATR). This humanoid-type robot can interact in our daily lives and naturally participate in human society. It will be a platform to develop various types of service robots and exist as a partner in human society. The fundamental requirement is to communicate and recognize human and other robot presence. Robovie supports such aspects and provides sufficient information by using a natural language communication function.
- RIKEN (The Institute of Physical and Chemical Research) is developing the distributed autonomous robot system which features multiple robots with learning functions collaborating with each other through an infrared light communication network. A small capsule called Intelligent Data Carrier (IDC) is mounted in each robot which makes ant-like collaborative motion possible. The system can be applied to medical fields, disaster sites and maintenance work at atomic power plants.

Humanoid robots are based on marriage of multidisciplinary technologies such as system engineering, information engineering and new materials, and is, as it were, imaged as a melting pot of technology fusion. (Miyazaki)

Japan Science and Technology Corporation

The Japan Science and Technology Corporation (JST) is a governmental organization with the mission of funding basic research, dissemination S&T information, and technology transfer. JST spends approximately half of its budget of over 100 billion yen on basic research: The four basic research programs are:

- Core Research for Evolutional S&T (CREST) - To make breakthroughs in future S&T by utilizing Universities and other Research Institutions. Budget: 29.1 billion-yen.
- Exploratory Research for Advanced Technology (ERATO) - To develop new and original research areas. Budget: 7.8 billion-yen.
- Precursory Research for Embryonic S&T (PRESTO) - Support research on new ideas or concepts by individual researchers. Budget: 4.0 billion-yen.
- International Cooperative Research Project (ICORP) - Supports joint international basic research. Budget: 2.1 billion-yen. (Lyons)

Aerospace

Contract Completion: "Investigation of Passive Control Devices for Potential Application to a Launch Vehicle Structure to Reduce the Interior Noise Levels During Launch", Prof. Colin Hansen, Adelaide University, Australia. Prof. Hansen and his team evaluated acoustic environment reduction using passive vibro-acoustic devices on a launch vehicle structure. This AOARD-funded contract extends work begun at AFRL/VS and resulted from an Air Force researcher's trip to Adelaide. Further work is ongoing under a contract supported jointly by AOARD and AFRL/VS. (Nowack)

Contract Completion: "Synthesis of the Passively-Damped Strain-Energy Hinge for Solar Array Deployment", Dr. Moon Kwak, Dongguk Univ., Seoul Korea. This contract investigated a hinge for solar array deployment that is much simpler than torsional springs and dampers currently employed. As shown in the figure, the hinge is made of two curved shell pieces, similar to those in a tape measure. The hinge starts in a post-buckled state and ends in the straight pre-buckled state. Previous work at AFRL/VS demonstrated the extreme difficulty of modelling the non-linear hinge behavior. Dr. Kwak performed experiments and simple flexible multi-body deployment simulations to advance this behavior prediction effort. Part of the effort compared a simple strain energy hinge to one that included visco-elastic damping material. It was determined that the visco-elastic hinge provided a superior velocity profile but it did not help reduce residual post-deployment vibrations. This effort was funded jointly by

AOARD and AFRL/VS. The AOARD manager for this contract was Dr Tom Kim. (Nowack)

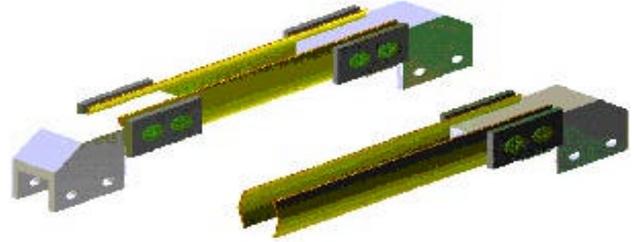


Figure 1: Hinge for Solar Array Deployment

Conference: Symposium on Development of Manufacturing Technology Infrastructure, Tokyo, 31 January-1 February.

This symposium was sponsored by the Institute for Transfer of Industrial Technology (ITIT). ITIT supports cooperative projects to improve the technology base in developing countries. Japan is good at assimilating and then improving foreign technology and is using these skills to help other nations do the same. This symposium was a forum to report on projects sponsored by the Mechanical Engineering Laboratory (Tsukuba, Japan) in the area of manufacturing technology. China, Malaysia, Singapore, India, Thailand, Korea, and Mexico were represented.

Beginning 1 April 2001, a new Digital Manufacturing Research Center will be created as MEL falls under the new AIST (National Institute of Advanced Industrial Science and Technology). The development of a software framework for modular design and manufacturing software is a seven-year centerpiece project. Moving away from increasingly large off-the-shelf computer-aided engineering tools, this project mission is to provide a tailorable suite that allows small and medium enterprises to exploit Kaizen (continuous improvement) in the software world. This is reminiscent of young Toyota's rejection of Detroit's huge machines in favor of small and easily reconfigured equipment. Hopefully, the world won't be taken by surprise this time since the project plans to use an open source software development approach, similar to the one used successfully to develop the Linux operating system. (Nowack)

Electronics and Physics

Contract concluded: "Instrumentation for multiplex spectroscopic sensing," Dr. Brian J. Orr, Macquarie University, Sydney, Australia, December 2000. Researchers at Macquarie University under Professor Orr, Chemistry Dept. Head, are developing pulsed radiation techniques for remote multispectral spectroscopic sensing applications of interest to the US Air Force. They have developed various pulsed optical parametric oscillator and amplifier systems that are well suited to a range of spectroscopic sensing and imaging applications. The project concluded was in the area of tunable lasers and non-

linear-optical devices that can be applied to spectroscopic sensing of gases in the atmosphere or elsewhere. The work is particularly applicable to various forms of remote sensing such as long-path absorption or DIAL/lidar (ground-based, airborne, or satellite-based). Another application is probe-based sensing. The approach in this application is to optoelectronically connect a central control unit to one or more optical-probe modules that can sample traces of specific gases in industrial or environmental settings. AFRL POC: Dr. Janet Fender, VS. (Maurice)

Contract awarded: “Novel Optical Materials Derived from Marine DNA for Optical Memory and Light Amplification Systems,” Dr. Naoya Ogata, Chitose Institute of Science and Technology, Hokkaido, Japan, December 2000: This project targets novel thin films derived from DNA, a well-known natural polymer. The focus is films which can be applied to optical devices for entry-erase, ultra-large capacity memory systems and optically-amplifying fibers for long-distance transmission. Dr. Ogata converts the DNA molecules to photonic, optically active materials by the intercalation of dyes within the DNA double-helical structure. These have dyes with optical memory or light amplifying properties. This novel material is derived from marine scallop and salmon sperm, an over-abundant in Hokkaido. No other work has been done to utilize DNA as a raw material for high technology. Professor Ogata’s research is quite unique and creative.

The project directly supports research on biochromophores and nonlinear optical polymers at AFRL/MLPS. In an upcoming WOS to UCLA, Dr. Ogata will join these researchers and their colleagues to present progress on his program. This is Dr. Ogata’s third project with AFOSR and AOARD on novel polymer complexes. For further info on the Institute, see ASL 23. AFRL POCs: Drs. Charles Lee (AFOSR/NL) and James Grote (AFRL/MLPS). (Maurice)

Contract awarded: “Establishment of Advanced Laser Processing for GaN Microdevice Manufacturing,” Dr. Koji Sugioka, RIKEN (The Institute of Physical and Chemical Research), Wako, Saitama, Japan, September 2000: GaN is a promising material for electronic devices where the application demands operation in harsh environments (high-power, high-speed, high-radiation). The same qualities of hardness and chemical stability, however, that make GaN so ideally suited in such applications, also obstruct its fabrication into devices. Viable processing techniques for etching and patterning have not yet been established. Laser ablation has proved to be a powerful technique to process many materials; however, for GaN, conventional lasers generate severe thermal damage. Dr. Sugioka’s project will establish a novel laser processing technique for the precision microfabrication of GaN. The hybrid technique, based on VUV-UV multiwavelength excitation, will be applicable to other hard materials. POCs: Drs. Henry Helvajian (Aerospace Corp.) and Gerald Witt (AFOSR/NE). (Maurice)

Conference: Quantum Effects and Related Physical Phenomena, Tsuda Hall, Tokyo, 20-21 December 2000: The Core Research for Evolutionary Science and Technology (CREST) program was initiated in 1995 to encourage Japan’s fundamental research by invigorating the potential of universities, national laboratories and other research institutions with the mission of building up the tangible foundation for the future direction of Japan’s science and technology. Research areas are normally selected by Japan Science and Technology Corporation (JST) within the framework of strategic sectors established by the Science and Technology Agency (STA) which was renamed Monbu-Kagaku-Sho (MEXT) in January 2001. JST executes cooperative research agreements with those involved in research and sponsors projects for five years and up to about 10 billion yen (about \$87M) for each project.

The Quantum Effects and Related Physical Phenomena project is a CREST research area which covers the state-of-the-art research into physical phenomena appearing in the ultra fine structure controlled at an atomic level. They are pursuing 1) the understanding of quantum phenomena of electrons and photons in nanostructures which are artificially fabricated or self-organized in semiconductor, metal and organic materials, 2) the development of techniques for controlling and measuring quantized signals from electrons and photons, 3) the synthesis and design of novel materials and so on. The project has more than 500 participants organized into 19 research themes.

Highlights of the symposium included:

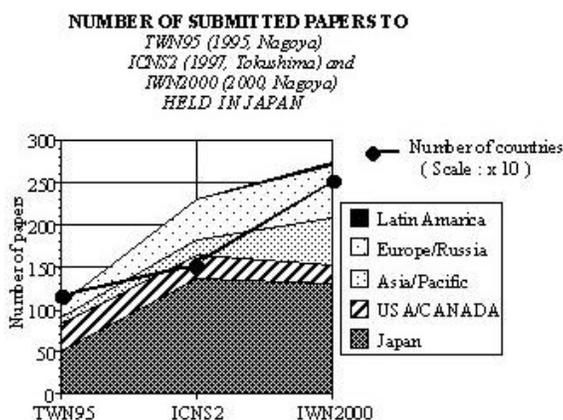
- Manipulation of Quantum Fields (Dr. Shimizu, Univ. of Tokyo) Phenomena in which both the matter field and the photon field exhibit conspicuous quantum effects were studied. Small systems were designed and fabricated in such a way that those phenomena are enhanced. Successful amplification of atomic waves was one result.
- Exploring Novel Functions of Artificial Nanostructures (Dr. Aono, Osaka Univ.) Multi-tip Scanning Tunneling Microscopy and Atomic Force Microscopy were constructed and applied to investigation of nano-wires, quantum-point-contact switches, molecular arrangement and photons emitted from tunnel gaps.
- Small Metallic Tunnel Junctions --- Physics and Applications (Dr. Ohtsuka, Univ. of Tsukuba) The various physics aspects of single electron tunneling phenomena were investigated and the nanofabrication technology was developed. A novel solid qubit device was fabricated successfully.
- Exploration of Far-infrared-techniques Based on Quantum Structures and Investigation of Quantum Phenomena (Dr. Komiyama, Univ. of Tokyo) The detection of single far-infrared (FIR) photons was successfully conducted using GaAs/AlGaAs single quantum dots. Final goals are geared toward development of ultra high sensitivity FIR detectors with single-photon detection, realization of tunable and continuous FIR lasers and phase-sensitive measurements of 2 dimensional electron gas systems at in high magnetic fields.
- Coherent Quantum Effects in Quantum Nanostructure with Atomic Layer Precision (Dr. Ogura, ETL) Crescent

AlGaAs/GaAs quantum wires with atomic layer flatness were realized with the flow rate modulation epitaxy of metal-organic chemical vapor deposition (MOCVD). The coherent interaction in the quantum nanostructure was confirmed both by optical and electronic measurements, and applications to non-linear optical devices and logical operation elemental components were exhibited.

The main topic of the final panel discussion was "Scientist's Dreams of Quantum Functional Devices - Photonic Functions". It was shown in theory and experiment that semiconductor quantum nanostructures were feasible for quantum cipher communication based on manipulation of amplitude and phase of both photonic wave and atomic wave holography. (Miyazaki)

Conference: International Workshop on Nitride Semiconductors, IWN 2000, Nagoya Congress Center, Nagoya, Japan; 24-27 September 2000. Over 500 international researchers participated in the highly successful IWN 2000. All current research fields in nitride semiconductor systems were covered, from fundamental science to emerging applications. Sessions included parallel technical, poster, and rump. Rump session topics were: 1) prospects for GaN-based electron devices, 2) progress of MBE technology for III-nitrides, and 3) nitride diode lasers. Largest participation came from Japan, the U.S., Korea, Taiwan, and Germany. Papers numbered about 300.

In comparison with previous international nitride conferences held in Japan, statistics shown in this figure are interesting:



Reflected is the rapid increase in numbers of papers from the Asia-Pacific countries, marking the spread of nitride technology throughout the world, particularly in Asia. The IWN was sponsored by the Japan Society of Applied Physics in conjunction with several other Japanese academic societies and was supported by the Tri-Service Asian research offices (AFOSR/AOARD, ONR IFO-Asia, and ARO-FE). For the benefit of the international nitrides community, IWN information, including the posted Proceedings, are available at <http://www.etl.go.jp/~iwn2000/Home.html> and http://www.ipap.jiap.or.jp/index_proceedngs.html (Maurice)

Conference: 7th International Symposium on Polymer Electrolytes (ISPE-VII), Noosa, Queensland, Australia, 6-11 August 2000. Over 100 international researchers participated in the AOARD-supported ISPE-VII devoted to solid polymer electrolyte (SPE) ion-conducting materials and systems. Topics included new materials, gel electrolytes, nanocomposites, spectroscopy, new theory and modeling, and diverse applications in advanced batteries, sensors and displays. With an increasing amount of exploration into alternative energy, ISPE-VII had a particularly strong emphasis on battery applications, especially proton conductors for polymer membrane fuel cells.

Solid Polymer Electrolytes (SPEs) are solid solutions of an electrolyte in a polymer (which acts as a solvent). Fast ion transport usually cannot occur in solids. The solid property of the material is due to the long macromolecules, which entangle and/or become chemically stapled, or "crosslinked," thus restricting molecular mobility and creating a macroscopically rigid material. Microscopically, the material behaves differently -- viscously, with viscosity affected by both salt dissolution and temperature. SPEs are characterized by their ionic conductivity in terms of carrier transport and carrier generation processes. The objective is to obtain high ionic conductivity. Inorganic and molten salts dissolved into the polymer incorporate along side-chain segments of the polymer backbone. Their local rotary motion provides the basic mechanism for ion transport. Ionic conductivity of SPEs is limited by the coupling of ionic motion with segmental (sidechain) motion. The addition of plasticizers is used to enhance conductivities by lowering viscosity and thus increasing the mobility of the segmental sidechains. Plasticizers are also used to increase the dielectric constant of the system, thus facilitating the formation of ions. Side-chain segments can also act as plasticizers. Restricting local mobility of the sidechains, the occurrence of crystallization inhibits ionic conductivity and can halt ion transfer.

Issues addressed at the ISPE were ion conductivity at ambient temperatures, crystallization at high salt concentrations, cation transport, stability and durability of the material for a long-term use (passivating layer forms at the electrode/electrolyte interface with cycling), structural chemistry of polymers, design of new salts and new anion-cation combinations and their different chemistries which condition the system. Also reported were ceramic-polymer nanocomposites that have the intriguing property of high conductivity at low temperature, and photoelectrochromic reactions in composite films, which have unique applications in lasers, as flexible phosphors, or as active components in luminescent displays. In addition to discussion of these challenging issues, ISPE-VII also included a Workshop on impedance analysis. (Maurice)

Site Visit: Extreme Energy-Density Research Institute (EDI), Nagaoka University of Technology, Nagaoka, Niigata, Japan, July 2000: The EDI was established by the Japanese government in 1999. After just one year, it is already widely known for its excellent R&D of pulsed power technology and associated applications. Extreme energy-density engineering

involves the state of simultaneously achieving high temperature, high pressure, and intense magnetic fields. EDI's research activities include:

- Materials science by ablation plasma (produced by an intense pulsed light ion beam) and pulsed wire discharge
- Laser science by pulsed glow discharge
- Environmental applications of intense relativistic electron beams
- Applications in energy by intense pulsed ion beams

EDI developed and constructed a series of pulsed-power generators under an "ETIGO" project. ETIGO-II, the largest pulsed-power generator in Japan, is used mostly for the preparation of thin films, ultrafine nanosize powders and fullerenes by high-density ablation plasma. Additional uses include materials' surface modification and high-power microwave generation. ETIGO-III provides a relativistic pulsed electron beam to study flue gas treatment and high-power microwave generation. An ion beam accelerator provides many ion species for diagnostics in materials characterization (such as Rutherford backscattering and particle-induced X-ray emission spectroscopy (PIXE)), and ion implantation. The ETIGO-IV was also developed for new applications in materials science and new levels of high-power microwave production. Consisting of capacitors, pulse-forming line, pulsed transformer, and magnetic switches, it is capable of delivering to a matched load an output pulse of 400-500 kV, 13 kA in current, and 200 ns pulse width, at a repetition rate of 1Hz. It. The EDI intends to use this latest machine for the generation of repetitive, pulsed ion-beams with applications in material processing, such as ion-beam ablation and pulsed ion-beam surface treatment of materials.

Recently reported research specifics include:

- fabrication of porous ceramic membranes by pulsed wire discharge,
- foil acceleration by intense pulsed ion beam,
- ferroelectric thin films by backside pulsed ion-beam evaporation,
- pulse discharge for excimer laser excitation w/ gas flow,
- high pressure, pulsed glow discharge in gas density depletion,
- pulsed flow discharge for excimer laser excitation,
- shock waves of the same,
- AlN ultrafine powders made by laser ablation,
- synthesis of intermetallic films by intense pulsed ion-beam evaporation,
- preparation of hard material (B4C and CN) films,
- preparation of phosphor thin films,
- induction linear accelerator energy measurements,
- nanosize powders by pulsed wire discharge,
- general thin film deposition by pulsed ion beam,
- high-power microwave generation by coaxial vircator,
- repetitive pulsed power generation, and
- the ion-beam sublimation of solids.

The EDI is directed by Professor Kiyoshi Yatsui, who has been well known to the international Energy community since his days at Cornell's High Voltage Laboratory. He welcomes

willing and challenging collaborations towards furthering this science. <http://etigo.nagaokaut.ac.jp/> (Maurice)

Human Systems

Conference: The First International Conference on Systems Biology, Tokyo, Japan; 14-16 November 2000. Systems Biology is a new field of research which has been proposed to emphasize a systems-level understanding of biological systems. This First International Conference on Systems Biology (ICSB) attempted to bring together researchers working in the field of Systems Biology including computer science, simulation, mathematics, physics, and molecular biology. The Keynote Speech, "Perspectives on Systems Biology" was given by Dr. Kitano, Director of the ERATO funded Kitano Symbiotic Systems Laboratory (see article in this ASL). This was followed by a Plenary Invited Talk by Dr. Nakamura of the University of Tokyo's Institute of Medical Science on "Genome Project and the Future Medicine". Scientific sessions included (1) Software Platform and Data Resources, (2) Reconstruction & Reverse Engineering of Genetic Network, and (3) System-level Analysis. Plans include a follow-up conference ICSB-2001 at California Institute of Technology next year. <http://www.symbio.jst.go.jp/> (Lyons)

Conference: Second Korea-Japan Joint Workshop on Neurobiology and Informatics (NBNI-2000), Kyongju, Korea; 20-21 November 2000. Sponsored by the Japan RIKEN Brain Science Institute, the KAIST Brain Science Research Center, and the Korea National Institutes of Health Biomedical Brain Research Center, this workshop covered biological, computational, and engineering approaches to brain science, brain engineering, and biomedical brain research. In addition to the Plenary Sessions, there were breakout sessions on both Engineering ("Creating the Brain") and Biomedical ("Protecting the Brain") aspects of the brain. Chinese scientists participated in this Workshop and NBNI-2001 will be held in Hangzhou, China. The Conference Organizer and Director of the KAIST Brain Science Research Center, Dr. Soo-Young Lee, presented his research on "Artificial Vision and Auditory Systems Based on Biological Brain Mechanism". He will present this research in the US on a future Window-on-Science visit to the Air Force Research Laboratory. (Lyons)

Conference: 7th International Conference on Neural Information Processing, Taejon, Korea; 14-18 November 2000. ICONIP is an annual conference sponsored by the Asia-Pacific Neural Network Assembly (APNNA). The themes of this year's Conference included both computational and engineering approaches to neural information processing and cognitive science. With 339 attendees from 22 countries, the Conference was introduced by Dr. Seo, the Korean Minister of S&T. Of the 271 papers presented 101 were from Japan, 57 from Korea, 13 from China, and 6 from Singapore. Topics included cognitive science, neurodynamics, neurobiological systems, brain imaging, language processing, learning &

memory, learning algorithms, evolutionary neural systems, neural network architectures, intelligent control, expert systems, fuzzy neural systems, soft computing, data mining, pattern recognition, signal processing, artificial life & group intelligence, artificial vision, neuro chips, and bio-inspired vision chips. Dr. Lyons presented as part of a panel on "Brain Research in the 21st Century". There was also a Special Collocated Japan-Korea Workshop on Vision. The 8th International Conference on Neural Information Processing (ICONIP2001), will be held in Shanghai, China, 14-18 November 2001. <http://www.cie-china.org/iconip2001/> (Lyons)

Conference: 2000 Contaminated Site Remediation Conference, Melbourne, Victoria, Australia; 4-8 December 2000. The 2000 Contaminated Site Remediation Conference in Melbourne, Victoria successfully followed the 1999 conference. Both the 2000 and 1999 conferences were organized by the Centre for Groundwater Studies, Perth, Australia, which is collocated with the Commonwealth Science and Industrial Research Organization (CSIRO), Soil and Water Division. The Centre for Groundwater Studies conducts research, provides consultation, and offers specialized training courses.

The 2000 theme "From Source Zones to Ecosystems" emphasized the continuity of issues along the pathway from the spill zone to the impact location, and the need to focus attention on ecosystem issues. One conference focus was associating the risk to receptors (human and ecological) from remediation efforts - asking what impact the remediation efforts may create. Metals contamination and their impact were discussed, recognizing that the bioavailability of these metals to the human and ecological receptors are not well understood. There were four sub-themes:

- Remediation to reduce impacts to ecosystems - How do we set targets?
- Investigation and monitoring of remediation and ecosystems - Beyond national protocols.
- Levels of intervention to manage environmental risk - Does monitored natural attenuation have a role in the remediation tool kit?
- Remediating complex source zones - What's really achievable?

Nearly 300 delegates from 20 countries attended, with 43 platform presentations, 72 poster presentations and a Trade Exhibition. The Chairman of the Victorian EPA Dr. Brian Robinson opened the conference. Dr. Glenn Suter II (US EPA) then presented the conference keynote address "The Logic of Ecological Risk Assessment for Contaminated Sites". There were six other national and international keynote speakers. Of special note was Maj Wade Weisman who delivered an invited talk on the efforts of the National Total Petroleum Hydrocarbon Criteria Working Group and their evaluation of human health risk from petroleum contaminated sites. The presentation also discussed the AFRL/HES and STTR project that evaluated toxicological impacts of a narrow, aromatic fraction of jet fuel that corresponds to one of the fractions defined by the Working Group. This represents the first study that evaluated this hydrocarbon mixture in an attempt to validate the human health

risk approach for jet fuel and other hydrocarbon fuels. The conference resulted in several worthwhile contacts, including a chemist interested in completing an in depth analytical characterization of the test material used in Maj Weisman's study. This information is needed in order to complete the risk analysis for the petroleum mixture.

The proceedings, consisting of two volumes of 108 papers with over 800 pages (edited by C D Johnston, CSIRO Land and Water), are available for Aus\$100 plus postage and handling from Greg.Davis@per.clw.csiro.au or Fax: +61-8-9333 6211 (Lyons)

Conference: In Silico Biology 2000; "IT+Genome" Changes BioScience, Noguchimemorial, Tokyo, 21 October 2000. The basic survey on applications of In Silico Biology for creating epoch-making living cells or bio-molecules is conducted by Agriculture, Forestry and Fisheries Technical Information Society (AFFTIS). The symposium, held annually to demonstrate their activity, had an attendance of more than 300.

Highlights included:

- **Key Note Lecture (Prof. Watanabe, Keio University).** Dr. Watanabe is well known for his pioneering work in molecular biology. He stressed the necessity of bio-informatics (In Silico Chemistry) and fulfillment of education. Computer simulation could be one of the most powerful method for progress.
- **Genome decryption and functional explanation: In case of rice paddies (Ine) (Dr. Higo, Biology Research Lab.).** The 1st stage of genome project of Ine was focused on genome mapping of over 2000 DNA markers and making physical map for rice paddies chromosome (1991 - 1998). The 2nd stage (Millennium Project) has been carried out under 7 projects including bio-informatics newly since 1999.
- **Genome analysis and role of bio-information network (Prof. Goto, Kyoto Univ.)** As a post genome analysis, Kyoto University is developing a novel computer algorithm for functional analysis and network analysis of genome and protein (KEGG: Kyoto Encyclopedic of Genes & Genomes, <http://www.genome.ad.jp/kegg/>).
- **Functional Genomics of coliform bacillus (Prof. Mori, NARA IST).** In order to accelerate complete understanding of coliform bacillus, 12 research teams in Japan's universities were grouped into 4 organizations. Abstraction of functional unit from coliform bacillus has been conducted intensively.
- **Cell simulation and its application to future medical care (Prof. Tomita, Keio Univ.)** For the simulation of metalism within cells, E-CELL system was developed and virtual cells have been designed as shown in Fig.1. The designed metalism can be applied to virtual experiment for new medicine and medical treatment. For further information, contact refer to URL (<http://www.afftis.or.jp>) (Miyazaki)

Site Visit: Center for Neuroscience, National Sun Yat-Sen University (NSYSU), Kaohsiung, Taiwan, August 2000: To promote international exchange and research excellence, NSYSU's Center for Neuroscience was established in August 1998. A team of 18 neuroscientists from Kaohsiung and nearby Tainan are assembled at the Center. Their expertise is in biophotonics, biomedical engineering, neuro-physiology, -chemistry, -pharmacology, molecular medicine, and applied math.

Neuroscience is often regarded as enigmatic because of its complexity. The new Center aspires to unlock the mystery of the brain and to become a center of excellence in neuroscience in the Asia-Pacific region. Prof. H.H. Chan, Inaugurating Director, is an internationally known neuroscientist. He hosted the recent APS 2000 Confocal Microscopy meeting at NSYSU in August (see ASL 28). (Maurice)

Material Science

Contract awarded: "Studies of the localized excitons in AlInGaN/InGaN quantum structures for high-efficiency light-emitting diodes for future lighting," Dr. Shigefusa F. Chichibu, University of Tsukuba, Institute of Applied Physics, Tsukuba, Japan: GaN is a promising material for solid-state lighting. Material defects, however, greatly reduce the output power and lifetime of GaN-based light-emitting devices. In-alloying improves the quantum efficiency of the material. Without it, free carriers or excitons get trapped by misfit threading dislocations within the crystalline epilayers. Yet, the role of In is unclear. Towards increased device performance, this project seeks to understand the role of In-alloying in improving quantum efficiency and thus performance. The work will determine whether AlGaInN quaternary alloys can be grown epitaxially as a wider bandgap, higher quality, more stable and miscible alloy system that can replace that presently used in InGaN ternary alloy systems. These systems are used to form quantum-well heterostructures and superlattices in the light-emitting channels of the GaN-based laser diodes.

Prof. Chichibu, an active committee member on several key MITI research projects, will collaborate with colleagues Shuji Nakamura and Steven P. DenBaars of UCSB. The means for growing high quality GaN heteroepitaxial layers was first established by Prof. Nakamura in Japan. Since 1996, the team has championed the basic optical physics in GaN heteroepitaxial layers, the preparation of low-dislocation density GaN layers by lateral epitaxial overgrowth, and nearly strain-free low-dislocation density GaN substrates. The localized exciton recombination model of light emission from InGaN quantum-well structures was first proposed by them in 1996, after which several institutes followed their lead in the study of emission properties. The present project will provide an understanding of the effect of In-alloying on the emission mechanisms in AlInGaN quantum structures. Their hexagonal-phase AlInGaN

structures are fabricated by metal organic vapor phase epitaxy (MOVPE). AFRL POC: Dr Cole Litton (AFRL/MLPS). (Maurice)

Conference: Symposium on Computational Materials Chemistry, Maui, HI; 19-21 December 2000. The purpose of this meeting was to bring together some of the world's experts in developing and applying high performance computational methods for designing new materials of interest to the Department of Defense (DoD) in general and to the Air Force in particular. Therefore, particular focus was on new high-energy fuels, coatings, heterogeneous catalysis, surface chemistry, and optical materials.

The meeting was held at the Maui High Performance Computing Center (MHPCC) in Kihei, Maui, HI. This center is a Distributed Center of High Performance Computing Modernization Program (HPCMP), providing resources to HPCMP researchers, the Pacific Region DoD community, other government organizations, private industry, and academia. Established in 1993 by the Univ. of New Mexico (UNM), under a cooperative agreement with the Air Force Research Laboratory, MHPCC is a recognized leader in scalable computing technologies and applications.

Symposium organizers included Prof. Mark Gordon (Department of Chemistry and Ames Laboratory, Iowa State Univ.), USA; Dr. Ruth Pachter (Air Force Research Laboratory, Materials & Manufacturing Directorate), USA; Prof. Takako Kudo (Department of Chemistry, Faculty of General Studies, Gunma Univ.), Japan; Prof. Gyusung Chung (Department of Chemistry, Konyang Univ.), Korea; and Dr. James Newhouse, (Univ. of New Mexico, Maui High Performance Computing Center), USA. Featured speakers included Prof. Shigeru Nagase (Department of Chemistry, Graduate School of Science, Tokyo Metropolitan Univ.), Japan; Prof. Yoon Sup Lee (Department of Chemistry, KAIST-Korea Advanced Institute of Science and Technology), Korea; Prof. Yuriko Aoki (Department of Chemistry, Graduate School of Science, Hiroshima Univ.), Japan, as well as participants from the Univ. of New Mexico, Univ. of Cincinnati, IBM, Iowa State Univ. and UCLA. Participants presented talks on their research in the application of theoretical chemistry and physics to the study of new materials, with ample time allocated for discussions following each presentation. This generated animated and productive interactions among the scientists. Perhaps the most useful outcome of the workshop was that many scientists from rather different areas of expertise were brought together. There was general agreement that we all learned about areas we had not been exposed to previously. It is hoped that such workshops can be continued in the future. AOARD provided travel support for Asian researchers through the Window-on-Science program. (Pachter AFRL/MLPJE)

Site Visit: Ohkawa GaN Lab, Department of Applied Physics, Science University of Tokyo, Tokyo, Japan, November 2000: The Science University of Tokyo offers one of the oldest physics curricula in Japan – 120 years old. The University, split between 2 campuses, graduates approximately

20% of all Japanese educated physics students. The total student population is 18,000, with 500 professors, and about 550 students graduated from 4 physics curricula every year.

Two years ago the University got into Nitrides. Prof. Kazuhiro Ohkawa -- formerly of Matsushita Central Research Laboratories, Professor Emeritus of Universitat Bremen, and inventor of p-type doping in ZnSe-based systems -- heads the new nitrides laboratory (<http://www.rs.kagu.sut.ac.jp/~okwlab/signature.htm>). Dr. Ohkawa invented not only p-type doping by nitrogen plasma source but also n-type doping for ZnSe-system by using Cl donors. These remain, to date, the only way to realize II-VI blue-green laser diodes. Initially involved in MBE II-VI compounds, he found growth techniques to realize high quality II-VI semiconductor compounds, and now he's into MOVPE Nitrides. Besides extensive state-of-the-art characterization equipment, the Lab has unusual capabilities: both a new NIPPON SANSO MOVPE reactor and the software ability to understand the metal-organic-vapor-phase-epitaxy (MOVPE) growth process and reactions. In MOVPE, achieving both good Hall (carrier) mobility and efficient growth is very difficult, so this software-reactor combination is important for optimizing growth and attaining high mobility. To optimize growth conditions, they currently *do not* use a low-temperature buffer layer. High-quality GaN has been obtained, and the next plan is to obtain high-quality layers *with* the use of a low-temperature buffer layer. Prof. Ohkawa can perform 1-, 2-, and 3-flow MOVPE simulations with varying concentrations. (Maurice)

Site Visit: GaN Blue-Light Semiconductor Laser Project, National Sun Yat-Sen University (NSYSU), Kaohsiung, Taiwan, August 2000: A new NSYSU project focuses on Nitride semiconductor materials for optical devices. To date, many properties of this new material remain unknown. In order to study the growth mechanisms, electronic properties, and optical behavior, the GaN project, initiated in 1999, links faculty members and facilities in the Department of Physics, the Institute of Material Science and Engineering, and the Institute of Electro-Optical Engineering. Professors Ikai Lo, Li-Wei Tu, K.Y. Hsieh, and M.H. Tsai -- with considerable expertise in II-VI and III-V group wide-bandgap semiconductor materials -- are leading this Nitride study. The project will measure electron mobility, carrier concentration, impurity concentration, energy bandgap, exciton recombination, film thickness, layer structure, microstructure of defects, and defect density. The group recently set-up a molecular beam epitaxy (MBE) laboratory to grow GaN quantum structures for blue laser diodes. Though most group III-nitrides are now grown by metal organic chemical vapor deposition (MOCVD), MBE can result in high-purity material and provide better control of interfaces than MOCVD. They hope to use the new system to develop improved p-doping.

Unlike the electronics of bulk material, the electronic properties in quantum (well) structures are governed by quantum (confinement) effects within the structures, such as the 2-dimensional electron gas (2DEG) formed at material interfaces. NSYSU's project will study these effects and the role they play

in governing the electronic and subsequent optical material properties, and thus their role in determining the electro-optical performance of laser diodes.

Prof. Ikai Lo, Physics Dept. Chairman, was recently sponsored under WOS for a 1-month visit to MLPS, augmenting their own MBE efforts. Dr. Lo has co-authored many publications with POC Dr. Bill Mitchel, AFRL/MLPS. (Maurice)

Micro Systems

Workshop: Material Nanotechnology Program, JA Hall, Tokyo, 13 November 2000. Nanotechnology involves designing and controlling all functional characteristics based on atomic scale material structure, and is a key technology of the 21st century. The objectives of specialists from academia and industry at the workshop was investigating visions of advanced material nanotechnology and breakthroughs for realizing industrial nanotechnology. The primary research theme was discussed and solutions for implementation were sought through collaboration with industry, government institutes and universities.

Prof. Kishi (Univ. of Tokyo) presented a review of Japanese nanotechnology science activities in comparison to the US. Pros and cons of the three fabrication methods (bottom-up, top-down and self-organized synthesis) were explained. Two challenging flagship projects were proposed as primary investment targets. Their achievability was presented.

Key concepts for the following presented projects included material synthesis, new functionalization and integration.

- Precision Polymer Project (Dr. Nakahama, Tokyo Inst. Tech.)
- Nano-glass Material Project (Dr. Hirao, Kyoto Univ.)
- Synthesis of Nano-particle and Functionalization (Dr. Okuyama, Hiroshima Univ.)
- Nano-metal Project (Dr. Yasuhiko, Tohoku Univ.)
- Nano-coating Project (Dr. Yoshida, Univ. of Tokyo.)
- Nano-intelligent Material Project (Dr. Yokoyama, ETL)
- Nano-measurement Project (Dr. Ono, NRLM)

A final panel discussion was on structuring and systemization of knowledge throughout the nanotechnology project. Advantages and weaknesses of Japan's national projects were also discussed, especially those related to efficient usage of government budget. Proposals, questions and comments submitted at the workshop will be taken into consideration as the national nanotechnology project kicks off this year. For further information, contact the Mr. Y. Sato of New Energy and Industrial Technology Development Organization (NEDO) at e-mail: qkgk@nedo-go.jp. (Miyazaki)

Workshop: Topical Workshop on the Frontier of Nanometer Scale Industrial Science - Founding Information Based Generic Technology for the 21st Century (Nanotechnology 2000); Daiichi-Hotel, Tokyo, 30 October 2000. Nanotechnology is expected to become an initiator for

accomplishing revolutionary development in the IT era. New Energy and Industrial Technology Development Organization (NEDO) will establish six new national projects on nanotechnology beginning April 2001. In the workshop, nanotechnology was defined as novel material technology for realizing intensive information structures based on the atomic scale, and futuristic devices and systems were envisaged from the point of view of ultra high integration density and ultra low power consumption. Moreover, as industry is eager to develop nanointelligent material, material nanotechnology and strategic approaches were explored through panel discussions.

Highlights included:

- **Trends of nanotechnology and its strategic research** (Dr. Tanaka, JRCAT) - proposed the need to establish of strategic scenarios and assessment systems for projects, Japan can catch up with US.
- **Prospects and perspectives of nanotechnology in electronics and information industries** (Dr. Sone, NEC Ltd.) - noted that carbon nanotube material functions as a quantum effect device operable at room temperature and introduced various applications.
- **Objective of nanointelligent material project** (Dr. Yokoyama, ETL) - explained four bottle necks in microelectronics and exemplified usefulness of nanointelligent material.
- **Molecular nanotechnology** (Dr. Matsushige, Kyoto Univ.) - four technological problems were presented that limit realization of molecular computers.
- **Nanoscience and computer science** (Dr. Terakura, NAIR) - self-assembled monolayer which was a typical example of self-organization structure was envisaged and advanced super parallel computation was proposed.

A revised roadmap of NEDO research project will be made based on comments from the workshop. NEDO will publish this updated project information soon. (Miyazaki)

Conference: The First International Symposium on Laser Precision Microfabrication (LPM 2000), Omiya, Saitama, Japan, 14-16 June 2000. Recent advances in laser technologies have enabled rapid growth in the laser-based processing of materials and micromachining. Tools have been developed that allow complex precision micromachining that incorporates step-and-repeat functions and can deliver multiplexed beams with multi-stage processing. This has made microfabrication of tapered nozzles, i.e. for ink-jet printers, micro-propulsion systems, and focal-spot scribing (i.e., within a material), possible. Efficient frequency conversion has allowed compact diode-pumped solid state (DPSS) lasers to emerge as viable sources of precision microfabrication. The laser has become the tool of choice for processing incompatible materials such as glass and semiconductors.

These were among the topics at the AOARD-sponsored LPM 2000. Organized towards facilitating these innovations, about 200 researchers representing 16 countries participated.

Industrial and pure research applications in microoptics, microelectronics, and micromechanics, from both research and industry were covered. Techniques included: ablation dynamics, surface and bulk structuring such as "nano-bumps" and other novel laser-textured surfaces, high-speed precision patterning, ultra-fast pulse processing, debris-free processing, and the processing of polymer, metal, ceramic, semiconductor thin films. In general, metals are processed at wavelengths from near-IR to visible, while ceramics, glasses, and polymers are processed with UV or ultrashort-pulse radiation. In glass processing, an important topic was the microfabrication of photonic components, i.e. the printing and trimming of gratings, lenses, relief holograms, and waveguide and circuit structures. The short absorption length in most ceramics and the high energy density on the sample result in ablation with little heat transfer into the piece and thus reduce thermal-induced cracking, a problem in the machining of brittle materials.

Novel highlights:

- Researchers under Dr. A. Yabe at Japan's NIMC achieve high-quality etching of transparent materials (glass, quartz, polymers) by ablation of an organic solution. A pyrene solution is used, which absorbs the UV and acts as a molecular heater. By use of this super-heated solution, the group reports on photochemical/thermal crystallization mechanisms. Also, in a 2-step irradiation method, they obtain crystallized complex oxide thin films.
- Dr. K. Sugioka of the Japan's RIKEN Institute presented novel hybrid laser technology for the precision microfabrication of hard materials such as the wide bandgap semiconductors (diamond, GaN, and SiC).
- Dr. Y.F. Lu of National University of Singapore reported a laser "steam cleaning" debris-removal method based on explosive boiling. This is useful on delicately-structured surfaces requiring non-contact.
- Researchers from the Osaka National Research Institute, Osaka U., and Tokushima U. presented work including: 1) formation of photonic crystals in resins by a 2-photon-absorption/photo-polymerization process, 2) "laser trapping" technology -- micromachining via optical radiation, 3) transient light-induced refractive index changes by laser microfabrication in polymer films, and 4) laser microexplosion fabrication by ultrashort pulses.
- Researchers at Chung-Cheng Institute of Technology and the Academia Sinica, Taiwan, report mechanisms to induce transformation of carbon fullerenes and nanotubes.
- Dr. Henry Helvajian of the Aerospace Corporation, presented an invited paper which drew much interest and discussion. The topic was nanosatellites and the MEMS-fabrication of unique glass-ceramic microthrusters.

LPM 2000 was supported by several of Japan's laser-processing societies. Much of the work presented falls under a national project entitled "Advanced Photon Processing and Measurement Technology." Japan is a world leader in laser microprocessing - especially with respect to the manufacture of electronic devices. (Maurice)

Upcoming Conferences In Asia

These upcoming conferences may be of interest to you. Contact us for more details or check our homepage at <http://www.nmjc.org/aoard/> Conferences in **BoldFace** are AFOSR/AOARD Supported.

Date	Name	Place
Mar 5-6, 01	The 3 rd Topical Symposium on Millimeter Waves (TSMMW2001)	Yokosuka, Japan
Mar 5-7, 01	The First International Conference on Molecular Electronics and Bioelectronics (1 st ICM&BE)	Hyogo, Japan
Mar 6-9, 01	6 th International Symposium on Advanced Physical Fields	Tsukuba, Japan
Mar 13-17, 01	IEEE Virtual Reality 2001 Conference	Yokohama, Japan
Mar 14-15, 01	2 nd International Seminar on Numerical Analysis in Engineering (NAE2001)	Batam Island, Indonesia
Mar 14-15, 01	The Second International Symposium on Mixed Reality (ISMR2001)	Yokohama, Japan
Mar 18, 01	Workshop on Autonomous Artificial Systems Exploring Hostile Environments	Dubai, U.A.E.
Mar 19-20, 01	3D Vision and Advanced Display Workshop	Hsinchu, Taiwan
Mar 28-30, 01	Microarrays and Microchips in Medicine Workshop at National Meeting of Pharm.	Sapporo, Japan
Apr 2-4, 01	International Symposium on Electromagnetics in Biology and Medicine	Tokyo, Japan
Apr 18-20, 01	2001 International Symposium on VLSI Technology, Systems, and Applications	Hsinchu, Taiwan
Apr 19-21, 01	32 nd International Symposium on Robotics (ISR 2001)	Seoul, Korea
Apr 19-23, 01	International Information Technology EXPO	Jinan, China
Apr 23-24, 01	Cooperative Database Systems for Advanced Applications (CODAS2001)	Beijing, China
Apr 23-24, 01	The First Korea/USA/Japan Workshop on Nanodevices	Seoul, Korea
Apr 23-25, 01	Joint 4 th IEEE International Conference on ATM and High Speed Internet (ICATM 01)	Seoul, Korea
Apr 24-27, 01	10 th International Space Planes and Hypersonic Systems and Technologies Conference	Kyoto, Japan
Apr 25-27, 01	Symposium on Photomask and Next Generation NGL Mask Technology VIII	Yokohama, Japan
May 3-4, 01	Australian Workshop on Nanotubes and Fullerenes	Canberra, Australia
May 6-10, 01	International Light Materials for Transportation System (LiMat 2001)	Pusan, Korea
May 6-11, 01	11 th Asia Pacific Military Medical Conference	Auckland, New Zealand
May 14-18, 01	13th International Conference on Indium Phosphide and Related Materials 2001 (IPRM'01)	Nara, Japan
May 16-18, 01	Laser Precision Microfabrication (LPM 2001)	Singapore
May 16-18, 01	2001 International Workshop on Distributed Shared Memory on Clusters (DSM2001)	Brisbane, Australia
May 20-23, 01	IFAC Workshop on Mobile Robot Technology	Jeju, Korea
May 20-24, 01	Sub Optic 2001	Kyoto, Japan
May 21-26, 01	International Conference on Robotics & Automation Exhibition (ICRA2001)	Seoul, Korea
May 21-26, 01	International Symposia on Materials Science for the 21 st Century (ISMS-21)	Osaka, Japan
May 27-30, 01	Congress on Evolutionary Computation (CEC2001)	Seoul, Korea
May 27-31, 01	The 10 th International Conference on Narrow Gap Semiconductors and Related Small Energy Phenomena, Physics and Applications (NGS 10)	Kanazawa, Japan
May 28-30, 01	4 th International Symposium on Assembly and Task Planning (ISATP2001)	Fukuoka, Japan
May 28-31, 01	The Second Asian Conference on Chemical Vapor Deposition	Kyongju, Korea
May 29-31, 01	12 th International Conference on New Information Technology (NIT 2001)	Beijing, China
Jun 3-8, 01	Seventh International Symposium on Solid oxide Fuel Cells (SOFC- VII)	Tsukuba, Japan
Jun 4-8, 01	The 13 th International Symposium on Power Semiconductor Devices & ICs	Osaka, Japan
Jun 6-8, 01	5 th International Conference on Mechatronics Technology	Singapore
Jun 6-8, 01	4 th Asian Conference on Robotics and its Applications	Singapore
Jun 6-8, 01	International Conference on Optical Engineering for Sensing and Nanotechnology (ICOSN2001)	Yokohama, Japan
Jun 10, 01	2001 International Workshop on Statistical Methodology for VLSI Design and Fabrication	Kyoto, Japan
Jun 10-11, 01	2001 silicon Nanoelectronics Workshop	Kyoto, Japan

Jun 10-15, 01	8 th International Conference on the Formation of Semiconductor Interfaces (ICFSI-8)	Sapporo, Japan
Jun 11-14, 01	2001 Symposium on VLSI Technology	Kyoto, Japan
Jun 12-16, 01	IEEE International Symposium on Industrial Electronics (ISIE 2001)	Pusan, Korea
Jun 13-16, 01	2001 symposium on VLSI Circuits	Kyoto, Japan
Jun 19-22, 01	8 th International Superconductive Electronics Conference (ISEC '01)	Osaka, Japan
Jun 20-22, 01	FPD Expo Taiwan 2001	Hsinchu, Taiwan
Jun 25-27, 01	The JST International Symposium on Superconducting Device Physics (SDP 2001)	Tokyo, Japan
Jun 25-29, 01	13 th International Conference on Composite Materials	Beijing, China
Jun 27-29, 01	International Conference on Affective Human Factors Design	Singapore
Jun 28-29, 01	The 8 th International Workshop on Femtosecond Technology (FST 2001)	Tsukuba, Japan
Jul 1-5, 01	Integrated Optics & Optical Communications Conference (IOOC) Opto-Electronics Communications Conference (OECC) Australian Conference on Optical Fibre Technology (ACOFT)	Darling Harbour Convention Centre, Sydney, Australia
Jul 1-6, 01	5th International Symposium on Advances in Polymers and Composites	Singapore
Jul 1-6, 01	International Conference on Materials for Advanced Technologies (ICMAT2001)	Singapore
Jul 4-6, 01	International MEMS (Micro Systems) Workshop 2001	Singapore
Jul 5-7, 01	6 th Asia-Pacific Regional Conference of International Telecommunications Society (ITS 2001)	Hong Kong, China
Jul 9-13, 01	8th IFIP TC 13 Conference on Human-Computer Interaction (INTERACT 2001)	Tokyo, Japan
Jul 11-13, 01	The 8 th International Workshop on Active-Matrix Liquid-Crystal Displays-TFT Technologies and Related Materials (AM-LCD '01)	Tokyo, Japan
Jul 15-18, 01	International Conference on Tropical Ecosystems: Structure, Diversity and Human Welfare	Bangalore, India
Jul 15-19, 01	The 4 th Pacific Rim Conference on Lasers and Electro-Optics (CLEO/Pacific Rim 2001)	Chiba, Japan
Jul 15-19, 01	International Meeting of the Psychometric Society (IMPS-2001)	Osaka, Japan
Jul 15-20, 01	7 th International Symposium on Magnetic Field and Spin Effects in Chemistry and Related Phenomena	Tokyo, Japan
Jul 16-18, 01	Fourth International Symposium on Impact Engineering (ISIE/4)	Kumamoto, Japan
Jul 16-19, 01	CLEO Pacific Rim 2001 and InterOpto 2001	Chiba, Japan
Jul 17-22, 01	International Conference on Phenomena of Ionized Gases (XXV ICPIG)	Nagoya, Japan
Jul 24-27, 01	2001 International Symposium on Signals, Systems, and Electronics	Tokyo, Japan
Jul 25-27, 01	The 40 th Society of Instrument and Control Engineers Annual Conference (SICE2001)	Nagoya, Japan
Jul 30-31, 01	First Asian Conference on Vision	Kanagawa, Japan
Jul 30-Aug 3, 01	4 th International Conference on Biological Physics (ICBP 2001)	Kyoto, Japan
Jul 30-Aug 4, 01	The 13 th International Conference on Crystal Growth (ICCG-13)	Kyoto, Japan
Aug 1-4, 01	Asia-Pacific Radio Science Conference	Tokyo, Japan
Aug 6-10, 01	IUPAC International Congress on Analytical Science 2001	Tokyo, Japan
Aug 18-30, 01	International Association of Geomagnetism and Aeronomy (IAGA) and International Association of Seismology and Physics of the Earth's Interior (IASPEI) – Joing Scientific Assembly	Hanoi, Vietnam
Aug 19-25, 01	International Conference on Photoresponsive Organics and Polymers 2001 (ICPOP2001)	Cheju Island, Korea
Aug 21-24, 01	International Conference on Integrated Logistics	Singapore
Aug 27-30, 01	7 th International Conference on Foundation of Quantum Physics and Advanced Technology	Hatoyama, Saitama
Sep 2-5, 01	4 th International Conference on Non-contact Atomic Force Microscopy (NC-AFM2001)	Kyoto, Japan
Sep 2-7, 01	Fifteenth International Symposium on Air Breathing Engines	Bangalore, India
Sep 3-5, 01	9 th International Symposium on Integrated Circuits, Devices Systems (ISIC 2001)	Singapore
Sep 6-9, 01	Fifth International Conference on Knowledge-Based Intelligent Information Engineering Systems & Allied Technologies	Osaka and Nara, Japan
Sep 10-12, 01	International Symposium on Micromechatronics and Human Science (MHS 2001)	Nagoya, Japan
Sep 10-12, 01	Solar Terrestrial Magnetic Activity & Space Environment	Beijing, China
Sep 10-14, 01	Second International Conference on Inertial Fusion Science and Applications	Kyoto, Japan

Sep 16-20, 01	Third US/Australia Joint Workshop on Defense Applications of Signal Processing	Adelaide, Australia
Sep 21-23, 01	The First International Symposium on Measurement, Analysis, and Modeling of Human Functions (ISHF2001)	Sapporo, Japan
Sep 24-28, 01	5 th International Conference and Exhibition on High-Performance Computing in the Asia-Pacific Region	Gold Coast, Australia
Oct 2-6, 01	The 6th International Conference on Laser Ablation (COLA '01)	Tsukuba, Japan
Oct 4-5, 01	The 1 st International Symposium on Advanced Fluid Information (AFI-2001)	Sendai, Japan
Oct 8-11, 01	Narrow Band-Gap Nitride Workshop	Guilin, China
Oct 11-13, 01	6 th Annual Conference on Liquid Atomization and Spray Systems-Asia (ILASS-ASIA 2001)	Busan, Korea
Oct 15-18, 01	The third International Conference on Information, Communications and Signal Processing (ICICS 2001)	Singapore
Oct 15-19, 01	6 th International Conference on Mercury as a Global Pollutant	Minamata, Japan
Oct 16-19, 01	21 st International Display Research Conference (Asia Display)	Nagoya, Japan
Oct 16-19, 01	International Conference on Computer Networks and Mobile Computing	Beijing, China
Oct 17-21, 01	2001 International Conference on Control, Automation and Systems (ICASE)	Cheju Island, Korea
Oct 21-26, 01	8 th International Conference on Environmental Mutagens	Shizuoka, Japan
Oct 22-24, 01	EMF Biological Effects and Standards Harmonization	South Korea
Oct 22-24, 01	2 nd International Symposium on Multispectral Image Processing and Pattern Recognition	Wuhan, China
Oct 23-26, 01	The 2nd Asia-Pacific Conference on Intelligent Agent Technology (IAT-2001)	Gunma, Japan
Oct 23-26, 01	The 1st Asia-Pacific Conference on Web Intelligence (WI-2001)	Gunma, Japan
Oct 24-26, 01	8th Microoptics Conference (MOC'01)	Osaka, Japan
Oct 28–Nov 2, 01	International Conference on Silicon Carbide and Related Materials 2001 (ICSCRM2001)	Tsukuba, Japan
Oct 29-31, 01	JSASS 15th International Sessions in 39th Aircraft Symposium	Gifu, Japan
Oct 29-Nov 3, 01	IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2001)	Maui, Hawaii
Oct 31-Nov 1, 01	The 7 th International Micromachine Symposium	Tokyo, Japan
Oct 31-Nov 2, 01	2001 International Microprocesses and Nanotechnology Conference	Shimane, Japan
Nov 5-9, 01	22 nd Asian Conference on Remote Sensing (ACRS2001)	Singapore
Nov 6-9, 01	5th International Conference on Durability Analysis of Composite Systems (DURACOSYS 2001)	Tokyo, Japan
Nov 7-9, 01	2001 International Symposium on GPS/GNSS	Cheju Island, Korea
Nov 7-10, 01	International Symposium on Optoelectronics and Microelectronics	Nanjing, China
Nov 11-14, 01	3 rd International Symposium on Atomic Level Characterizations for New Materials and Devices '01	Nara, Japan
Nov 11-16, 01	9 th International Conference on the Conservation and Management of Lakes	Shiga, Japan
Nov 12-16, 01	Asia-Pacific Optical and Wireless Communications Conference and Exhibit (APOC 2001)	Beijing, China
Nov 13-16, 01	7th Japan International SAMPE Symposium and Exhibition (JISSE-7)	Tokyo, Japan
Nov 14-18, 01	The 8 th International Conference on Neural Information Processing	Shanghai, China
Nov 19-21, 01	11th International Conference on Composite Structures	Monash, Australia
Nov 26-30, 01	International Symposium on Photonics and applications (ISPA)	Singapore
Nov 27-30, 01	7th International Conference on Education and Training in Optics and Photonics	Singapore
Dec 2-5, 01	The 10 th IEEE International Conference on Fuzzy Systems	Melbourne, Australia
Dec 3-6, 01	Asia Pacific Symposium on Multi-Dimensional Microscopy 2001	Melbourne, Australia
Dec 4-7, 01	5 th East Asian Conference on Chemical Sensors (EACCS 01)	Nagasaki, Japan
Dec 5-7, 01	The Eighth East Asia-Pacific Conference on Structural Engineering and Construction (EASEC-8)	Singapore
Dec 17-19, 01	International Symposium on Microelectronics and MEMS	Adelaide, Australia
Dec 18-20, 01	ISAI 2001 International Symposium on Artificial Intelligence	Kolhapur, India
Feb 20-22, 02	Third Australasian Congress on Applied Mechanics	Sydney, Australia

Jun 25-27, 02	International Symposium on Distributed Autonomous Robotic Systems	Fukuoka, Japan
Jul, 02	Topical Workshop in Heterostructure Materials (TWHM'02)	Japan
Jul 7-11, 03	5 th International Congress on Industrial and Applied Mathematics	Sydney, Australia

Upcoming Window-on-Science Visitors

Contact us for more details if you are interested in the following WOS visitors.

Dates	Visitor Name	Affiliation and Country	Topic	Visit Location
2-8 Mar, 01	Dr. Richard Goris	Yokohama City University School of Medicine, Japan	The Role of Capillary Blood Flow in Regulating Afterimage in Snake Infrared Receptors	AFRL/MNMF 2 Mar 01 Attend the Biomimetics and Biotechnology Program Review at Philadelphia Airport 4-6 Mar 01 AFRL/MLP 8 Mar 01
22-26 Mar, 01	Prof. Naoya Ogata	Chitose Institute of Science & Technology, Japan	Novel Optical Materials Derived from Marine DNA for Optical Memory and Light Amplification Systems	AFOSR/NL AFRL/MLPO UCLA, Los Angeles, CA
26 Mar-3 Apr, 01	Dr. Toru Aoki	Shizuoka University, Japan	Group II-VI Compound Semiconductors, Nitrides, Nitrides Characterization, Nitrides Growth & Semiconductors	AFRL/MLPS Electrochemical Society 199 th Meeting, Washington DC
29 Mar-3 Apr, 01	Dr. Irina Talanina	The Australian National University, Australia	A New Class of Tbit/s Optical Processing Devices: Theory & Applications	Graduate Engineering & Research Center, University of Florida
10-12 Apr, 01	Prof. Koichi Shimizu	Hokkaido University, Japan	Biological Effects of ELF Electrical Fields	AFRL/HEDR
16-24 Apr, 01	Dr. Zhe Chuan Feng	Institute of Materials Research and Engineering, Singapore	Wood-Witt GaN Defects Reduction Program	AFRL/MLPA AFOSR/NE
17-27 Apr, 01	Dr. Frank Houwing	Australian National University	Shock Tunnel Testing, Hydrogen Fuelled Scramjets, Hypersonic Flow Separation, Nonequilibrium Nozzle Flows	AFRL/PRA
17-22 Jun, 01	Dr. Yusuke Teramoto	Graduate School of Science and Technology, Japan	Observation of Plasma Motion in a Coaxial Plasma Opening Switch with a Chordal Laser Interferometer	AFRL/DEHE PPPS 2001, Las Vegas, NV
17-29 Jun, 01	Dr. Weihua Jiang	Nagaoka University of Technology	High-Power Pulsed Power Generator Applications	AFRL/DEHE PPPS 2001, Las Vegas, NV University of New Mexico Texas Tech University
16-24 Jul, 01	Dr. Shigefusa F. Chichibu	University of Tsukuba, Japan	Laser Diodes, Nitrides, Nitrides Characterization, Nitrides Growth & Optoelectronic Materials	AFRL/MLPS 4th International Congress on Nitride Semiconductors, ICNS-4, Denver, CO UCSB, Materials Science Department, Goleta, CA
27-30 Aug, 01	Dr. Takashi Ishikawa	Nihon University, Japan	Cryogenic Composite Tank for the Future Japanese Spaceplane Effort	AFRL/VSDV
27-30 Aug, 01	Prof. Chang-Sun Hong	Korea Advanced Institute of Science & Technology	The Improved FBG Sensor System using a Wavelength-Swept Fiber Laser (WSFL)	AFRL/VSDV
28-30 Aug, 01	Dr. Dong-Whan Choi	Korea Aerospace Research Institute, South Korea	Current Status & Prospect of the Korean Aerospace Industry	AFRL/VSDV
28-30 Aug, 01 9-12 Sep, 01	Prof. O-II Byon	Nihon University, Japan	Fabrication Method of the Unidirectional Polymeric Composite Material	AFRL/VSDV American Society for Composites
9-12 Sep, 01	Prof. Hiroshi Fukuda	Science University of Tokyo	Compression Bending Test Method to a CFRP Pipe	AFOSR/NL

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