



# Asia Science Letter



**Information Bulletin of the Asian  
Office of Aerospace Research and Development  
Tokyo, Japan**

ASL Volume 32

Jul-Sep 01

*The Asia Science Letter is a quarterly 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

Japan is moving toward using competitive grants to distribute research funding. Of Japan's very large research investment currently only about 9% is distributed by competitive grant. Even though this 9% represents a tripling in the past 5 years, it is still less than the average of 30-40% among developed countries (Nikkei Weekly, "Japan Economic Almanac, 2001"). But Japan plans to double this figure over the next 5-year period. Prominent Japanese scientists have also increased their interest in AFOSR funding opportunities.

AOARD is pleased to welcome two new Program Managers. In July, Dr. Kenneth C. Goretta, a Materials Scientist from Argonne National Laboratory will join AOARD. Dr. Goretta's areas of expertise include mechanical and electrical properties of ceramics, metals, and composites; ceramic synthesis and fabrication; microstructural studies; kinetic studies; quality control; failure analysis; erosion and corrosion problems; and ferrous metallurgy. He has a Ph.D. in Materials Engineering from the Illinois Institute of Technology (May 1986). Before arriving at Argonne National Laboratory in 1987, Dr. Goretta was a researcher at Caterpillar Corp, at Nalco Chemical Co., and at the Pennsylvania State University Center for Advanced Materials. Dr. Goretta has eight patents on improved electronic ceramics. He has more than 290 peer-reviewed publications and more than 200 presentations.

Dr. Tae Woo Park is also expected to arrive in Tokyo in July to cover the areas of mathematics, modeling, and propulsion. Dr. Park has been the chief of Applications and Assessment Branch of the Space & Missiles Propulsion Division, Propulsion Directorate, AFRL.

He received a Ph.D. in mathematics, with emphases on classical analysis, probability theory, and statistics, from the University of California, San Diego. He has worked at the AFRL-Edwards site for the last 23 years, and has interests in: mathematical and statistical modeling & simulation; signal processing; research in data acquisition, analysis techniques, and interpretations; optimization of systems; artificial intelligence; CFD, and fracture mechanics. He will also be supporting Dr. Brett Pokines in the area of application, design, and fabrication of micro-systems.

Terence Lyons, Director

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# Feature

## **Nakamura Inhomogeneous Crystal Project New National Project in Japan, Nitrides Update**

Dr. Shuji Nakamura -- inventor of the Blue, Green, and White LEDs, and the Blue Laser -- continues to make news in Japan. Since he left Nichia Corporation for UC Santa Barbara last year, he has been awarded several Japanese national and international prizes, and -- regarding why he left corporate research in Japan to become a Professor in the U.S. and his challenges since -- has been the focus of much media interest. He's been interviewed by Japanese magazines, featured on news programs, has provided lectures, and now even a book has appeared on the topic, transcribed from taped conversations with him, adding to his now numerous others.

Prof. Nakamura is in the news again -- this time, for being nominated Director of a new Japanese national project on GaN semiconductor entitled "Nakamura inhomogeneous crystal project" which commences this fall. The project will support work at UC Santa Barbara, the Science University of Tokyo, and the University of Tsukuba. Inhomogeneous properties of size, structure, and composition in the crystal material adversely affect devices constructed from it, however, also bring high luminosity and long life. It is strange, for example, that green and white LEDs can exist with defects. In the GaN-based devices Prof. Nakamura is famous for developing, the InN inhomogeneity in InGaN is suspected of lowering the influence of defects. The new project will focus on the synthesis of defect-free bulk GaN. It will theoretically and experimentally determine the relation of nano-level non-uniformity's and defects in GaN semiconductors, clarifying their role towards development of advanced electrical devices. The project will possibly open a new field in crystal and materials research.

Every year one of the newly-consolidated Ministries of the Japanese government (Monbu-Kagaku-Sho or "MEXT") awards four new projects of 5-yr duration for fundamental research in strategic sectors. The projects are executed by the Japan Science and Technology Corporation (JST). They are cooperative research agreements called "Exploratory Research for Advanced Technology" (ERATO) projects, and each can amount to as much as 10 billion yen (or \$85 million). For more information on ERATO, see <http://www.jst.go.jp/erato/>. Technically related articles appear in ASL 30 & 31 (Tsukuba U. and Science University of Tokyo). (Maurice)

## **The Indian Software Industry, Education, and Research**

The Indian software industry has caught the world's attention. It had revenues of \$8 billion dollars in 2000, up from \$100 million in 1990, and more importantly has been growing very rapidly. One of its main locations, Bangalore (in south India) experienced a growth rate for year 2000 in excess of 80%. Another key place, Hyderabad (in mid-India), experienced 127%. Hyderabad alone has 3000 software companies, 800 of which are engaged in export of software. Other loci of importance are Madras, Delhi, and Mumbai (Bombay).

To understand the dynamics of the software industry and the education and research that supports it, AOARD sent Dr. Edward Feigenbaum on a visit to Bangalore and Hyderabad in January 2001. He visited the main academic science center in Bangalore, the Indian Institute of Science (IIS) and the Indian Institute of Information Technology (IIIT) in Bangalore. In Bangalore and Hyderabad, he visited large and small software companies. In Hyderabad, he visited with computer scientists at the University of Hyderabad; with the faculty of the IIIT of Hyderabad; and with officials at the impressive government computer services center (where citizens gain interactive access to many government services).

The growth rate of the software industry has made the job title "software engineer" one of the most valued in India, so much so that software development is draining engineers from the other fields of engineering, endangering other technical development in India. The starting software engineer is paid \$500/ mo., and is generally well trained in mathematics and engineering skills. All speak (essentially perfect) English.

Some of the biggest American, European (and most recently Japanese) corporations in information technology have established software development organizations in India. Indian governments at the federal and state levels support the industry well. In particular, they have supported a satellite communications infrastructure for the new “software parks,” and the establishment of the new IITs in various cities to train more software engineers.

At the IIS in Bangalore, research on large-scale computation is performed using an IBM multiprocessor supercomputer that was recently upgraded. The Supercomputing Center also does research on high speed networking and the “next generation internet” for India. Research on other topics, including Artificial Intelligence, is performed at the Computer Science Department of IIS. Many students of high quality are trained at IIS. IIS, incidentally, is one of the six technical research universities collectively known as the “IITs.” These institutes are famous for the superb quality of their graduates. About half of the IIT graduates emigrate to the USA, and Western Europe.

Universities, such as Hyderabad and Bangalore, are generally quite good in both quality of education and research. Because of the usual constraints, they have not been able to expand rapidly enough to meet the demand for IT graduates, so the new IIT “layer” of schools was organized. IITs are strongly supported by corporations. Corporations supply adjunct faculty and money for small research topics (but no long-range research appears to be done at IITs, in contrast to IITs and universities). More graduates are produced by another “layer” of engineering schools that correspond to the British “polytechnics.”

A question is often raised asking: are Indian software engineers and other IT specialists merely inexpensive or are they “creative?” The answer is “both”, depending on the organization, but the level of innovation and creativity seen by Dr. Feigenbaum was especially high in the fast-paced entrepreneurial small companies, and at the IIS.

The constraints on cooperation with Indian science are rapidly fading. Both DOD service laboratories and American corporate laboratories should send more visitors and begin significant cooperative activities with these dynamic and well-trained IT specialists. (Feigenbaum)

## Aerospace

**Site Visit: Mongolian Academy of Sciences Research Center of Astronomy and Geophysics, Khurel Togoot Observatory, Ulaanbaatar, Mongolia, May 2001.** Dr. Terry Lyons, LtCol Mark Nowack, and Maj Paul Bellaire (AFOSR/NM) traveled to Mongolia to check the progress of an AFOSR-sponsored contract on Asteroid-Search Astronomy being performed in collaboration with the University of Arizona "Spacewatch" program. Despite -40 C temperatures over the winter of 2000-2001, the resourceful Khurel Togoot staff has completed the telescope housing, prepared the control room, and installed the US-made Meade telescope and controlling computer systems. Telescope checkout and alignment is underway. The small cadre of Moscow-trained astronomers is working with old, but high-quality optical equipment, much from the former East Germany. They are operating several large astronomical telescopes and a solar telescope. They are also active in science outreach to schools in the Ulaanbaatar capital region. (Bellaire, Nowack)

**Window-on-Asia: Institute of Space and Aeronautical Science (ISAS), Sagamihara, Japan, 1 Mar–30 Apr 2001.** Dr. Stephen Kahler (AFRL/VSBXS) spent two months working at ISAS as part of the Window-on-Asia program. He used the 9-year collection of images from the Solar X-ray Telescope which is on board the Yohkoh spacecraft to study coronal holes

(<http://www.lmsal.com/sxt/homepage.html>). His work resulted in submission of a paper titled “The Origin and Development of Transient Coronal Holes” and a draft of a paper on long-lived solar coronal holes both co-authored with Dr. Hugh Hudson of ISAS. His contact with the ISAS staff also resulted in a Window-on-Science visit by Dr Aki Takeda to the Space Weather Center of Excellence at Hanscom AFB.

While in Japan, Dr. Kahler was also able to visit Dr. Yutaka Uchida and his research group at the Science University of Tokyo (<http://astro.yy.kagu.sut.ac.jp>). Dr. Uchida’s group is modeling dynamic magnetoplasmas including solar flares and eruptive events. Their quadrupolar magnetic field models match well with recent satellite data and allow for modelling events without magnetic reconnection (see Science Vol. 291:pp84-92). (Kahler, Nowack)

## Electronics and Physics

**Contract awarded: “Development of High-Energy Vircators for High-Power Microwave Generation,” Drs. Kiyoshi Yatsui & Weihua Jiang, Extreme Energy-Density Research Institute (EDI), Nagaoka University of Technology, Nagaoka, Japan, March 2001.** The vircator (virtual cathode oscillator) is attractive due to its lightweight, compact, simple design. However it suffers low efficiency operation due to RF pulse shortening, a phenomenon by which pulse length is significantly shorter than pulsed power pulse

length. This also limits the efficiency of high power microwave sources. In this project, a new feedback vircator will be experimentally tested - the feedback concept showing promise of overcoming the pulse-shortening problem. Researchers at the EDI will use their new electron beam accelerator, ETIGO-IV, to optimize vircator geometry, maximize efficiency, and determine performance limitations due to cathode behavior.

As a Visiting Professor at Texas Tech University, Dr. Jiang has recently contributed to a major MURI effort on high power microwaves. The present project directly supports research at AFRL/DEH and will contribute to the understanding of high-current, space-charge limited beams - an important technical challenge in all high-power microwave devices. For further info on the EDI, see <http://etigo.nagaokaut.ac.jp/> and also ASL #30. POC: Dr. John Gaudet (AFRL/DEHP). (Maurice)

**Contract awarded: "Energy band-bending and Fermi level shift of the surfaces and interfaces of (Al)GaN-metals due to surface treatments, and development of high quality contact systems," Dr. Tae-Yeon Seong, (K-JIST), South Korea, March 2001.** The introduction of various surface treatments improves the electrical properties of p-type ohmic contacts. This project, pursuing treatment methods that have proven effective in similar semiconductor systems, investigates the electrical, chemical, and structural properties of surfaces that have been treated to alter the surface carrier concentration, remove native oxides, and reduce surface states (and hence contact resistance) in p-GaN. Dr. Seong, uses treatments that include plasma etching, ion bombardment, and wet chemical etch. Fermi level energy band bending at the treated surface will be characterized, and the pretreatment effectiveness in reducing the p-type contact resistance evaluated. Co-PI on the research is Prof. I. Adesida of the University of IL at Urbana-Champaign. POC: Dr. Dan Johnstone (AFOSR/NE). (Maurice)

**Conference: Technology Trends of Superconductivity 2001; Toshicenter Hotel, Tokyo; 5 Jun 2001.** The International Superconductivity Technology Center (ISTEC) funded by Ministry of Economy, Trade and Industry (METI) began its new project in 1998. R&D of Fundamental Technology of Superconductivity Application included three themes; bulk superconducting materials, superconducting wires and superconducting electronic devices. Among those projects, energy saving technology has realized significant progress. Highlights included:

- ? Approach of New High Temperature Superconducting Material (Dr. Tajima, ISTEC). Bi-2223 and MgB2 were specifically investigated for exploring higher transition temperature.
- ? Next Generation Superconducting Wires (Dr. Shohara, ISTEC).
- ? Ultra-fast, low power SFQ devices (Dr. Tanabe, ISTEC).
- ? Superconductivity Electric Power Saving Magnet Energy Storage (SMES) System (Prof. Ohashi, Tokyo Univ.)

- ? Flywheel Energy Storage System Using a High Tc Superconducting Magnetic Bearing (Dr. Koshizuka, ISTEC)

Dr. S. Tanaka (Director of Superconductivity Research Laboratories) overviewed recent significant results:

- ? Bulk superconducting material attained maximum mechanical strength of 100Mpa and maximum trapped magnetic field of 16 T.
- ? Wire of 10 m length exhibited critical current density of  $5 \times 10^5$  A/cm<sup>2</sup> at 77 degree K.
- ? Josephson devices consisting of 100 junctions ran at more than 100 GHz.
- ? Novel material such as MgB2 was serendipitously obtained, showing possibility of higher Tc materials.

For more information on SNTT, refer to <http://www.sntt.or.jp>. For more information on ISTEC, refer to <http://www.istec.or.jp>. (Miyazaki)

**Conference: Superconductivity Research and Development for the 21<sup>st</sup> Century; Aoyamagakuin Univ., Tokyo; 24 May 2001.** This workshop was the first of two held to review the development of new superconductivity materials and devices. It was convened by the Society of Non-Traditional Technology (SNTT). SNTT was established in 1973 with support from the Science and Technology Agency (STA, now renamed to Ministry of Education, Culture, Sports, Science and Technology (MEXT)), and encourages basic scientific research, development and surveys on superconductivity material, eco-material, magnetic material, intelligent material, nano-material and functionally gradient material. Workshop highlights included:

- ? Discovery of New Superconductivity Materials (Prof. Akimitsu, Aoyamagakuin Univ.) The new material MgB2, which was announced in January, was analyzed from structures, physics and electronics perspectives, in conjunction with a historical review of the discovery. Prof. Akimitsu also suggested the possibility of other new materials with critical temperatures over the 39 degree K attained by MgB2.
- ? Superconductivity THz Laser and Single Electron Pair Tunneling Device (Prof. Yamashita, Tohoku Univ.) These novel devices are under development for high performance super computers for large scale information network and for a brain-type computer system.
- ? Magnetically Levitated Transport System (MagLev) (Dr. Nakahashi, JR-Tokai) The test line with a maximum speed of 552 km/hr (maximum relative passing speed of 1003 km/hr) was attained. Further experiments are continuing to improve durability and reduce production cost.
- ? Superconductivity NMR (Dr. Maeda, RIKEN) and MRI for Imaging Diagnosis (Dr. Ikehira, National Institute of Radiological Sciences) Novel NMR of 21.1 T magnetic intensity (900 MHz frequency) and MRI of 10 T magnetic intensity were explained as issues for next generation medical diagnosis equipment.

- ? Superconducting Magnet for Nuclear Fusion (Prof. Motoshima, National Institute for Fusion Science) Helical coil (LHD) for magnetic confinement was developed with a NbTi material of 9 T.

**Conference: 3rd Topical Symposium on Millimeter Waves (TSMMW 2001), Yokosuka Research Park (YRP), Japan, 5-6 March 2001.** About 200 international researchers participated in the annual TSMMW that convened in Japan's YRP, an area that hosts acclaimed communication laboratories such as NTT, NTT Docomo, and Japan's Communications Research Laboratory (CRL). Topics included current technologies for mm-wave and k-band monolithic millimeter/microwave integrated circuits (MMICs), antennas and devices, photonics for wireless access systems, and fixed wireless access systems. A special session featured mm-wave technologies at Korea's Electronics and Telecommunications Research Institute (ETRI). Leading experts from Taiwan also joined the meeting.

Among technologies in future mobile systems, TSMMW participants see phased-array antennas, software-defined radio concepts, orthogonal-frequency division multiple access (OFDM), and code division multiple access (CDMA) as most important. Also, integration of MMICs on the same substrate as the antenna is becoming more feasible. Presentation of work at Anritsu (Y. Kawahara) drew much discussion. Because metals suffer skin depth problems at higher frequencies, efficiencies suffer; but, based on a planar dielectric slab-guide design, Anritsu demonstrated a high-efficiency (70%) high frequency (76.5 GHz) mm-wave antenna. Also of interest were presentations by U.S. Professors Tatsuo Itoh (UCLA) and Linda Katehi (U. of MI), who reported on a compact sub-harmonic, high-frequency upconverter and novel RF MEMS, respectively. For more info on TSMMW, the series, sponsors and cooperating societies see: <http://www.ilcc.com/TSMMW/index.html> (Maurice)

**Conference: Advanced Research Workshop (ARW) on Semiconductor Nanostructures, Queenstown, New Zealand, 5-9 February 2001.** About 100 international researchers of nanostructure science and engineering participated in the Queenstown ARW that commemorated the 130th birthday of Nobel-Laureate/native-New-Zealander Lord Ernest Rutherford. Topics included low-dimensional and quantum transport, quantum dots, microcavities, magnetic nanostructures, magneto-optics, superlattices, phonons, and clusters.

#### Highlights:

- ? Nobel Laureate K. von Klitzing spoke on spin-dependent transport phenomenon in low-dimensional systems. Linking results from optical, infra-red, and transport measurements, he described a new and previously unknown magnetic phase in the fractional quantum Hall regime.
- ? M. Scholnick (Sheffield U., UK) described a new source of coherent light based on polariton emission from microcavities in semiconductor heterostructures. New lasing structures can be based on the effect.
- ? Y. Aoyagi (RIKEN, Japan) presented an improved growth technique of GaN films that uses standard epitaxial

methods. In the technique, silicon impurity atoms are deposited during the growth process. The atoms, acting as anti-surfactants, effectively terminate the threading dislocations and achieve dislocation densities 1000 times lower than in standard material. The technique may overcome the material defect problems that greatly reduce GaN-based device performance.

- ? R. Silva (U. of Surrey, UK) presented band gap modulated superlattice structures based on a single material system manufactured by RF PECVD. Superlattices were realized by simply changing the proportion of the  $sp^1$ :  $sp^2$ :  $sp^3$  bond ratio in amorphous carbon. It is believed that the observation of quantum effects at room temperature is due to the films' amorphous nature and the ability of hydrogen to passivate dangling chemical bonds. The technique can be used in diverse applications, and the formation of organized nanocrystals is an important step towards the realization of quantum devices.
- ? Spintronics – before achieving an active magnetoelectronic transistor, many challenges need to be resolved at the device level to understand coherent spin accumulation in quantum dot systems.

The Workshop was organized by the Royal Society of New Zealand and supported by the Japan Society for the Promotion of Science (JSPS), AOARD, ARO-FE, ONR and ONRIF-Asia. <http://www.phys.canterbury.ac.nz/ARW/main.html> (Maurice)

**Conference: International Symposium on Microelectronics and Assembly (ISMA'00), Singapore, 27 Nov - 1 Dec 00:** Over 300 international researchers participated in ISMA in Singapore. Coverage of the latest technological developments in microelectronics was showcased in almost 400 contributions representing over 1000 researchers. The Symposium consisted of 5 parallel conferences:

- 1) Microlithographic Techniques for IC Fabrication,
- 2) Advanced Processing Techniques,
- 3) Design, Modeling, and Simulation,
- 4) Microelectronic Yield, Reliability, and Advanced Packaging, and
- 5) Micromachining and Microfabrication.

Sessions addressed important issues in deep-submicron technology, wafer fabrication, yield and reliability engineering, micromachining and IC packaging. It additionally featured a microelectronics products and manufacturing equipment exhibit and an educational program consisting of several SPIE Short Courses offered by top industrial experts.

Participant issues centered about the performance of microelectronic packages – structural, electrical, thermal, and RF microwave – and what limits these, cost/power being the metric. To summarize the broad but basic topics of discussion:

- ? Device-level packaging and board-level packaging. “Wafer-level” packaging never went very far due to prohibitive costs, and was replaced by assembly and “chip-scale” packaging, which occur at the end-of-wafer-fabrication. Chip-scale packaging has become an indispensable technology to achieve light weight, and

compact size, as required for portable electronics. Associated with this were papers on die attachment technologies and interconnect configurations providing IC packages with smaller “footprints.”

- ? Device characteristics and their impact on packaging in terms of power and thermal performance/management and interchip signal speed. The overall electromagnetic behavior and properties of varied-material devices (many pieces put together) is not well understood.
- ? Fatigue, failure, and lifetime prediction of devices and packages. Focus on failure mechanisms that are kinetic in nature, involving chemical corrosion and interfacial diffusion/electromigration, and temperature. The cost-effective package of choice for high I/O ULSI devices for practically the entire industry is the plastic ball grid array (pBGA), introduced by Motorola in the mid-90’s, the main failure mechanism of which is solder-ball cracks.
- ? Motorola (Dr. Mali Mahaligam) presented topics on 1) RF wireless packaging schemes - i.e., unwiring via a radio solution enabling cable replacement, [www.bluetooth.com](http://www.bluetooth.com), 2) system-on-chip (SOC) vs. system integrated package (SIP), 3) low-temperature co-fired ceramic (LTCC) SIP packaging technology, 4) LTCC as a way of integrating RF and digital sides, and 5) green products such as lead free solders and bromine-free plastics.

In addition to strong industrial and academic representation, U S government research was presented in notable talks by DARPA and JPL. Dr. William Tang provided an overview of DARPA’s MEMS programs in an exciting plenary presentation. In another packed plenary, Dr. Chris Mack (FINLE Technologies, USA) overviewed current industry drivers in terms of push and pull, addressed why, for 40 years, exponential growth has been maintained according to (Gordon) Moore’s Law for number of transistors per chip. ISMA’00 was sponsored by Singapore’s Nanyang Technological University and SPIE (the International Society for Optical Engineering) and was AOARD-supported. (Maurice)

**Conference: 7th IEEE Singapore International Conference on Communication Systems (ICCS’00), Singapore, 20-24 November 2000.** About 100 researchers participated in the ICCS in Singapore with a focus on wireless communication system technologies. Topics included source coding, channel coding, CDMA, multi-user detection, networks, network infrastructure and traffic control, microwave circuits, signal processing, and antenna design.

Highlights include:

- ? A class of low-complexity codes was introduced for iterative decoding of Turbo single-parity-check-based tree (SPCT) codes. Singapore’s DSO National Laboratories (K.C. Chew) and the Hong Kong University of Science and Technology (W.H. Mow) presented codes with both most-unbalanced and balanced tree structures demonstrated performance improvements without increasing decoding complexity and by matching the tree structure to the targeted bit error rate.

- ? Researchers at the University of Melbourne, Australia (J. Manten and Y. Hua) presented a linear precoder design methodology for encoding short packets of a source signal for high-speed, time-varying channels in wireless systems. The theoretically justified method is based on using a combination of linear precoder and training sequence and is useful when the channel is unknown and absolute redundancy must be minimized.
- ? Researchers at the National University of Singapore (P. Hua) and in Canada (P. Polydorou) presented the impact of channel information on receivers in fading channels, deriving exact, closed-form expressions for the symbol error probability of a selection combining system. They are able to predict degradation as a function of the signal and noise power profiles of the channel.
- ? Researchers at the Center for Wireless Communication in conjunction with the Universities of Singapore and South Australia presented work on CDMA multi-user detection under imperfect power control. They report that separating users into 2 separate power groups improves performance significantly over power fluctuations with only a small penalty to the complexity of the CDMA multi-user detection algorithm.
- ? The University of Sydney (Telecommunications Lab) presented an efficient soft decision decoding algorithm for linear block codes in which decoding complexity is reduced by 5 orders of magnitude.
- ? A keynote speech by Dr. Fumiyuki Adachi of Tohoku University focused on the rapidly growing communication markets worldwide, noting the shift from mobile voice services to mobile Internet-related multimedia services. Many interesting statistics were presented. For example, in Asia, China has the fastest growth, outpacing even Japan and second only to the US. This growth is based on the least penetration (number of data users/populace) of all the markets surveyed (4%). Finland has the highest penetration, close to 75%, while levels in Italy and the UK are at about 60%, Japan is a little over 50%, and the US is about 25%.

ICCS 2000 was organized by the IEEE and the Center for Wireless Communication in Singapore, and was AOARD-supported. (Maurice)

## Human Systems

**Site Visit: Muroran Institute of Technology, Muroran, Hokkaido, Japan, 11 June 2001.** The Muroran Institute of Technology, one of five National Institutes of Technology in Japan, has 3,500 students including 600 graduate students enrolled in its Faculty of Engineering. The Muroran Institute of Technology was ranked #16 among the S&T Technology Schools in Asia by [Asiaweek](#). Research areas include Materials Science and Engineering (metallic materials and corrosion control), Civil Engineering (concrete strength and impact

studies), Mechanical Systems Engineering (high-efficiency engine utilizing detonation), and Electrical Engineering (high temperature superconductors).

We visited The Department of Computer Science and Systems Engineering (Professor Tomomasa Nagashima). Professor Nagashima established a Satellite Venture Business Laboratory in 1999 to study Kansei (human sensitivity) information and its applications to information technology. The research is organized into four Project areas:

- ? The Sound Project is studying sound including EEG event related potentials related to warning sounds. Other areas of study include analyzing and synthesizing emotions in human speech and studying singer's voices. Applications include improvement of warning sounds, sound system for relaxation and concentration, diagnosis systems for voice pathology, the development of music information processing software, and support systems for the study of music.
- ? The Fragrance Project studies the sense of smell including the effect of odors on EEG and skin thermal patterns. Applications include the development of systems for the stress reduction and the development of "Kansei" quality monitoring systems for fresh food.
- ? The View Project studies virtual reality applications such as 3D-dolphin interaction.
- ? The Bioinformatics project tries to integrate the findings of the other three projects into a database of 'Kansei' information. Applications include chaotic neural networks, customer-personalized databases, self-learning algorithms, 3D CAD System for utilizing 'Kansei' Information and medical applications (such as Computer-Aided Analysis for Genome and Diagnosis Support System for Histological Images).

The Institute will host an International Symposium: Toward the Development of KANSEI Technology (KANSEI 2001) in Muroran, 5-6 October, 2001 <http://www.svbl.muroran-it.ac.jp/Symp/KANSEI2001.html> For more information about the Muroran Institute <http://www.muroran-it.ac.jp> (Lyons)

**Conference: The 11th Asia Pacific Military Medical Conference (APMMC), Auckland, New Zealand; 6-11 May 2001.** The 11th meeting of the APMMC was attended by almost 300 delegates from 28 nations in the Asia Pacific Region. Many nations were represented by general officers. The meeting was jointly hosted by the U.S. Army Pacific (USARPAC) and the New Zealand Army. Also attending were the representatives of many U.S. research organizations including U.S. Army Research Institute of Environmental Medicine (USARIEM), U.S. Army Aeromedical Research Laboratory, Naval Medical Research Center, Naval Medical Research Unit #2 (Jakarta), the Naval Health Research Center, the Uniformed Services University of Health Sciences, and the Armed Forces Research Institute of Medical Sciences. Of the over 134 papers and posters many addressed military medicine issues including biosecurity, infectious disease including vaccine and drug development, and deployment issues. Specific research topics of interest included environmental health, human

performance at high terrestrial altitudes, performance enhancing agents, anthropometry, heat stress countermeasures, and vision/refractive surgery. The 12th Asia-Pacific Military Medicine Conference will be held in Malaysia in 2002. (Lyons)

**Site Visit: University of Otago, Department of Information Science, Dunedin, New Zealand, 4 May 2001.** The University of Otago is New Zealand's first university, founded in 1869. This Department has 15 academic staff (including three professors and one associate professor), 16 teaching fellows, and a technical and administrative support group. Internally funded laboratories include the Knowledge Engineering Laboratory, Software Engineering Laboratory, Database Research Center, Security Research Group, Software Metrics Research Laboratory, and the Multimedia Systems Research Group. Research areas include intelligent systems, AI systems which are self organizing/open space which evolve their functionality, intelligent human computer interaction and speech recognition, voice control including research on extraction of words, noise suppression for applications in noisy environments, software programming - grounded theory, distributed systems, networks/data communications, database systems, spatial information systems, and research on image recognition. The Department is also hosting annual and biannual conferences, among them is Artificial Neural Networks and Expert Systems 2001 (ANNES'2001), 22-24 November 2001. <http://divcom.otago.ac.nz/infosci/kel/conferences/annes2001/annes200.htm> and <http://www.otago.ac.nz/infosci> (Lyons)

**Site Visit: University of Otago, Clothing and Textiles Centre, Dunedin, New Zealand, 4 May 2001.** The Center provides research and advisory services for the apparel and textiles/leather sector and a variety of groups requiring technical and professional information on protective clothing. Research includes anthropometry, enhancing human performance in the development of workplace clothing, and research on bio-inspired materials such as fibers. (Lyons)

**Site Visit: University of Otago, Sensory Science Research Centre, Dunedin, New Zealand, 4 May 2001.** The Center undertakes fundamental and applied research on senses important in consumer products, including smell, taste, pungency, touch, appearance and internal sensory states (e.g. hunger). Professor John Prescott is exploring the display characteristics of the sense of smell, for example in their potential use as a warning display. (Lyons)

**Site Visit: University of Otago, New Zealand Environmental Health Research Centre, Department of Preventive and Social Medicine, Dunedin, New Zealand, 3 May 2001.** Established by the Health Research Council, the Center undertakes research and postgraduate research training in environmental and occupational health. Interest areas include the causes of occupational injury, noise and noise-induced hearing loss, the health of high-risk occupational groups, air pollution, occupational mortality and cancer, and the burden of occupational and environmental disease and injury. The Department is conducting research on fatigue and human performance including the hazards associated with shift work

and irregular hours of work. Recent projects include developing measures of fatigue using alcohol to validate the effects of fatigue on performance, studying aircraft maintenance shift rosters, and the regulation of heavy vehicle drivers in Australia and NZ. There is also close collaboration with the Sleep/Wake Research Center in Wellington. (Lyons)

**Site Visit: University of Otago, Sleep/Wake Research Centre, Wellington School of Medicine, 2 May 2001.** Dr. Phillipa Gander (formerly of NASA AMES) directs the center which conducts research on work and fatigue related error, regulation of heavy vehicle drivers in Australia and NZ, Air Traffic Controller napping, and sleep and performance impairment. Several research projects are being conducted with industry including investigation of the role of sleep in trucking accidents, study of fatigue-related errors in anesthetists, and a study of anesthetist in a mock operating theatre. There is also close collaboration with the Department of Preventive and Social Medicine in Dunedin. (Lyons)

**Site Visit: University of Otago, Aerospace Medicine, Department of Medicine, Wellington School of Medicine, 2 May 2001.** Dr. Robin Griffiths runs an Aerospace Medicine Distance Learning course from the University of Otago. The Postgraduate Diploma in Aviation Medicine is a three-year part-time course providing aviation medicine training to registered medical practitioners in New Zealand, the South West Pacific and Australia. In addition to many New Zealand and Australia alumni, the course is used by many nations worldwide which do not have a formal training program in aerospace medicine. (Lyons)

## Material Science

**Contract awarded: "Investigation of GaN and related heterostructures grown on free-standing GaN templates," Dr. Yongjo Park, Samsung Advanced Institute of Technology (SAIT), Korea, May 2001.** The current barrier limiting implementation of GaN-based devices is their performance. This is because the world lacks a viable substrate upon which to grow structures and fabricate efficient devices. The field faces a stalemate due to poor material quality, but this particular project holds potential to move the field forward. The project will supply SAIT's freestanding GaN templates - grown on sapphire and lifted off by a laser technique - to US collaborators, Professors Hadis Morkoç (Virginia Commonwealth University) and David Look (Wright State University), for full characterization. SAIT was successful in the production of crack-free 300  $\mu$ m thick, 1.5" diameter GaN substrate grown on sapphire by HVPE. A laser diode structure was grown on the GaN substrate using MOCVD, and lasing of 1mW output power was observed to last 2 hrs at room temperature.

The present effort will enable the growth of high-quality structures and devices and allow a fundamental baselining of

key material parameters. Devices based on these materials will have numerous AF and DOD applications and an enormous impact on high-power radars employed on air and space-borne platforms. The devices will be applicable to any application that demands high power and operation in harsh environments. The effort directly supports on-going technology demonstration programs in GaN and related III-Nitride semiconductor devices. Further info can be found at <http://www.sait.samsung.co.kr> POCs: Drs. Gerald Witt (AFOSR/NL) and Cole Litton (AFRL/MLPS). (Maurice)

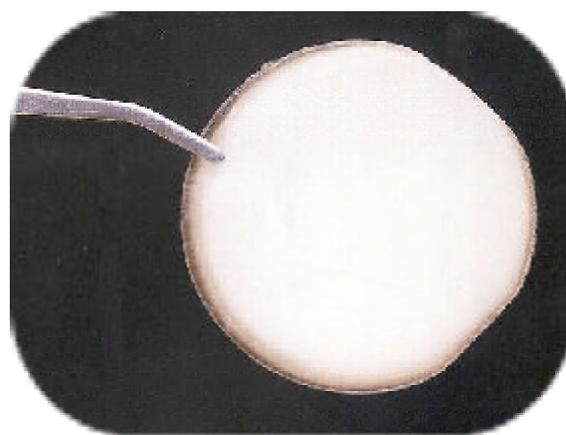


Figure: GaN substrate grown on sapphire by HVPE  
 ? Dislocation density:  $7 \times 10^6/\text{cm}^2$   
 ? Surface finish: mechano-chemical polish one side  
 ? Surface roughness (Ra): 10A

**Conference: Light Materials for Transportation Systems (LiMAT 2001), Pusan Korea, 6-10 May.** The second international conference on light materials attracted 300 participants representing 13 countries. AOARD was a supporting organization and in return received free registrations that AFRL attendees were able to use. (<http://www.postech.ac.kr/LiMAT2001/>) (Nowack)

**Site Visits: Fretting Fatigue, Japan, May 2001.** Dr. Shankar Mall (AFRL/ML) visited Japan in May to assess fretting fatigue research and present a paper at the International Symposium on Fretting Fatigue. Dr. Mall visited labs at Toshiba, the National Research Institute for Metals, Hitachi, and Kyushu University. The Japanese research tradition of long-term projects had a dramatic effect on fretting fatigue work. At each visit, long term testing was being performed, occupying multiple test machines, for periods up to 10 years. The result is that Japan is collecting data that is truly unique in the world. (Mall, Nowack)

**Workshop: Nanotechnology for Functional Carbon (Frontier Carbon Technology), Tokyo, Japan, 25-26 Apr 2001.** A Frontier Carbon Technology (FCT) project was launched in 1998 with support by the New Energy and Industrial Technology Development Organization (NEDO) for research and development in carbon-based high function materials technology. The objective is to develop novel carbon-based materials with properties surpassing conventional

materials through the control of binding between atoms and hetero element substitution. The FTC project is being carried out at two central research laboratories (National Institute of Advanced Industrial Science and Technology (AIST), and Osaka University), as well as at satellite research laboratories in seven private sector and research organizations. The recent public program included six main topics and one panel discussion. Highlights included:

- ? Overview of FCT Carbon Nanotube Research (Dr. Yumura, AIST) The catalytic thermal chemical vapor deposition method was improved for large scale production of carbon nanotube (CNT). Promising applications were proposed in field emission display, hydrogen storage material and secondary batteries.
- ? Carbon Nanotube and Fullerene Technology (Prof. Iijima, Meijo Univ.) New materials of single wall carbon nanotube and hybrid structures have been synthesized. The hybrid structures exhibited endohedral metallofullerenes (fullerenes with a metal atom encapsulated), and Gd-CNT in particular has shown unique molecular/crystal structural properties and electronic property fields. Prof. Iijima is heading the CNT project to develop novel mass production of single wall CNT.
- ? Novel Carbon Composite Material Technology (Prof. Takai, Nagoya Univ.) Cubic C<sub>3</sub>N<sub>4</sub> thin film was synthesized using an ion plating method. The film's excellent mechanical and electrical characteristics are superior to diamond-like carbon (DLC).

Carbon nanotubes are being considered applications to energy and electronic devices. Japan is leading in the application of CNT in optoelectronics.

The second day of the workshop was devoted to diamond nanotechnology and included an overview presentation by Dr. Kohashi of Osaka Univ. A microwave plasma chemical vapor deposition method was developed and used to fabricate an 8mm-diameter diamond epitaxial wafer. Also, a pyramid structure emitter array showed high emission current density of above 100 mA/cm<sup>2</sup>. Recently the New Diamond Forum committee announced a new diamond nanotechnology research road map for Japan. However, due to lack of matured single crystal wafer and processing technology, realization of diamond devices with excellent figure of merit might be far away. (Miyazaki)

## Micro Systems

**Site Visit: National Centre For Natural Sciences And Technology (NCST), Hanoi, Vietnam 12-14 Jun 2001:** The Centre has a research and education mission focused on the technology areas of information technology, biotechnology, materials science, electronics & scientific instrumentation, biological resources, ecology & environment sciences, and maritime engineering. Over 2300 personnel are employed within the seventeen institutes that compose the Centre led by Dr. Nguyen Van Hieu. NCST was founded in 1993 as a

reorganization of the National Centre for Scientific Research of Vietnam. The oldest institute; Oceanography, traces its history to 1923, while the majority of the Institutes date to the mid-1970's.

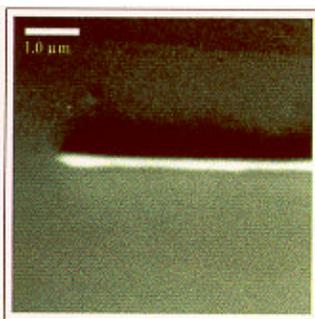
The Institute of Material Science (IMS) is the largest institute of NCST with more than 300 staff members. Research is being conducted on a number of topics at the IMS including rare-earth materials, corrosion resistance, and materials analysis. As a result of the rare-earth material research a mobile power generator has been commercialized. Issues and devices related to micro- & nano-systems are also being explored such as the fabrication NOX sensors and the study of optical properties of CdS nano crystals systems. The Institute fulfills its educational mission through cooperation with the International Training Institute of Material Science located at Hanoi University of Technology and The Ministry of Education and Training. Master of Science and Doctorate of Philosophy degrees are both offered through the joint program, and typically include overseas training in a premier laboratory.

Recent science-related international agreements between the USA and Vietnam include the establishment of a Vietnam educational trust fund, which will provide approximately \$80 million over 16 years to train Vietnamese in science, technology and medicine. A bilateral agreement normalizing trade relations between the U.S.A. and Vietnam is also moving forward. (Pokines)

**Site Visit: Research Centre for Nuclear Microscopy, Department of Physics, National University of Singapore, Singapore, 8 June 2001.** As reported in ASL Vol. 26, Jul-Aug 2000, researchers at the Centre are using a proton beam to expose resists such as Su-8 and PMMA to form high aspect ratio microstructures. The project has recently achieved two important results.

- ? The ability to consistently form structures with nanometer resolution (see the figure of the narrow line 150 nanometers wide with height of 1 micrometer) and
- ? the establishment of a reliable process to form Ni and Cu structures using the micromachined resist as a mold have been demonstrated.

The advantages of the process include low cost, three-dimensional structure formation, and structures with high aspect ratios. The recent advances demonstrate a mature process that is being targeted for commercialization by the Gintic Institute of Manufacturing Technology in Singapore. (Pokines)



**Conference: Tokyo-2001: Scanning Probe Microscopy, Sensors, and Nanostructures, Makuhari, Chiba, Japan, 27-31 May 2001.** The focus of the conference included the topics of scanning probe microscope technology, nano-bio systems, nano-sensors and nano-structure formation. Japanese researchers (72%) presented the majority of the technical papers and poster sessions. European researchers had a significant

presence contributing 16% of the session content. The analysis of nanostructures using tools such as atomic force microscopes was the overall theme of the conference and the subject of 48% of the papers. The use of nanostructures such as carbon nanotubes as atomic force microscope (AFM) sensors tips and low priced probe microscopes (Seiko NPX100) has yielded the ability to image a greater range of specimens. The result is an improved ability to image living cells, DNA structure, and methods to manipulate cells. Dr. Ikai of the Tokyo Institute of Technology presented a method to examine the force to unfold proteins. Dr. Xue from Chinese Academy's Institute of Physics presented work on forming nanodots and wires using Al, Ga, and In. Dr. Takahashi briefed work conducted at the University of Tokyo, which detailed the creation of InAS nanostructures. Additional work presented from the University of Tokyo included the enhancement of AFM performance through the construction of probes composed of many cantilevers to improve high frequency measurements and reduce thermal noise. (Pokines).

## 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
Jul 9-13, 01	8th IFIP TC 13 Conference on Human-Computer Interaction (INTERACT 2001)	Tokyo, Japan
Jul 11-13, 01	The 8 <sup>th</sup> 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 <sup>th</sup> 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 <sup>th</sup> 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 23-27, 01	The 10 <sup>th</sup> International EISCAT Workshop	Tokyo, Japan
<b>Jul 24-27, 01</b>	<b>2001 International Symposium on Signals, Systems, and Electronics</b>	<b>Tokyo, Japan</b>
Jul 25-27, 01	The 40 <sup>th</sup> Society of Instrument and Control Engineers Annual Conference (SICE2001)	Nagoya, Japan
<b>Jul 30-31, 01</b>	<b>First Asian Conference on Vision</b>	<b>Kanagawa, Japan</b>
Jul 30-Aug 3, 01	4 <sup>th</sup> International Conference on Biological Physics (ICBP 2001)	Kyoto, Japan
Jul 30-Aug 4, 01	The 13 <sup>th</sup> International Conference on Crystal Growth (ICCG-13)	Kyoto, Japan
Aug 1-4, 01	Asia-Pacific Radio Science Conference	Tokyo, Japan
Aug 6-8, 01	11 <sup>th</sup> IEEE Workshop on Statistical Signal Processing	Singapore
Aug 6-10, 01	IUPAC International Congress on Analytical Science 2001	Tokyo, Japan
Aug 13-16, 01	Sixth International Symposium on Signal Processing and its Applications (ISSPA 2001)	Kuala Lumpur, Malaysia
Aug 19-31, 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

<b>Date</b>	<b>Name</b>	<b>Place</b>
<b>Aug 19-25, 01</b>	<b>International Conference on Photoresponsive Organics and Polymers 2001 (ICPOP2001)</b>	<b>Cheju Island, Korea</b>
Aug 21-24, 01	International Conference on Integrated Logistics	Singapore
Aug 27-30, 01	7 <sup>th</sup> International Conference on Foundation of Quantum Physics and Advanced Technology	Hatoyama, Saitama
Aug 27-31, 01	The Third International Conference on Cognitive Science (ICCS2001)	Beijing, China
Sep 2-5, 01	4 <sup>th</sup> 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 <sup>th</sup> International Symposium on Integrated Circuits, Devices Systems (ISIC 2001)	Singapore
<b>Sep 6-8, 01</b>	<b>Chitose International Forum on Photonic Sciences</b>	<b>Chitose, Japan</b>
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 12-13, 01	US-Japan Workshop: Low Cost Production of Ceramics and Related Materials	Osaka, Japan
Sep 10-14, 01	Second International Conference on Inertial Fusion Science and Applications	Kyoto, Japan
<b>Sep 16-20, 01</b>	<b>Third US/Australia Joint Workshop on Defense Applications of Signal Processing</b>	<b>Adelaide, Australia</b>
Sep 21-23, 01	The First International Symposium on Measurement, Analysis, and Modeling of Human Functions (ISHF2001)	Sapporo, Japan
Sep 24-28, 01	5 <sup>th</sup> International Conference and Exhibition on High-Performance Computing in the Asia-Pacific Region	Gold Coast, Australia
Sep 25-27, 01	14 <sup>th</sup> International Symposium on Superconductivity (ISS 2001)	Kobe, Japan
Sep 26-28, 01	2001 International Conference on Solid State Devices and Materials (SSDM 2001)	Tokyo, Japan
Oct 2001	EMF Biological Effects and Standards Harmonization	South Korea
<b>Oct 2-6, 01</b>	<b>The 6<sup>th</sup> International Conference on Laser Ablation (COLA '01)</b>	<b>Tsukuba, Japan</b>
Oct 3-5, 01	RWC 2001 Final Exhibition and Symposia	Tokyo, Japan
Oct 3-5, 01	4 <sup>th</sup> International Conference on Evolvable Systems: from Biology to Hardware	Tokyo, Japan
Oct 4-5, 01	The 1 <sup>st</sup> International Symposium on Advanced Fluid Information (AFI-2001)	Sendai, Japan
Oct 5-6, 01	International Symposium: Toward a Development of KANSEI Technology (KANSEI 2001)	Muroran, Hokkaido, Japan
<b>Oct 7-11, 01</b>	<b>Narrow Band-Gap Nitride Workshop</b>	<b>Singapore</b>
Oct 10-12, 01	International Conference on Sensing Units and Sensor Technology	Wuhan, China
Oct 11-13, 01	6 <sup>th</sup> Annual Conference on Liquid Atomization and Spray Systems-Asia (ILASS-ASIA 2001)	Busan, Korea
Oct 15-17, 01	3 <sup>rd</sup> International Conference on Experimental Mechanics	Beijing, China
Oct 15-18, 01	The third International Conference on Information, Communications and Signal Processing (ICICS 2001)	Singapore
Oct 15-19, 01	6 <sup>th</sup> International Conference on Mercury as a Global Pollutant	Minamata, Japan
Oct 16-19, 01	21 <sup>st</sup> International Display Research Conference (Asia Display)	Nagoya, Japan
Oct 16-19, 01	International Conference on Computer Networks and Mobile Computing	Beijing, China
Oct 16-19, 01	International Symposium on Optical Memory (ISOM2001)	Taipei, Taiwan
Oct 17-20, 01	The 7 <sup>th</sup> International Lasers, Optoelectronics and Photonics Exhibition	Beijing, China
Oct 17-21, 01	2001 International Conference on Control, Automation and Systems (ICASE)	Cheju, Korea
Oct 21-26, 01	8 <sup>th</sup> International Conference on Environmental Mutagens	Shizuoka, Japan
Oct 22-24, 01	WHO EMF Biological Effects and Standards Harmonization Asian Regional Meeting	Seoul, Korea
Oct 22-24, 01	2 <sup>nd</sup> International Symposium on Multispectral Image Processing and Pattern Recognition	Wuhan, China
<b>Oct 23-26, 01</b>	<b>The 2<sup>nd</sup> Asia-Pacific Conf. on Intelligent Agent Technology (IAT-2001)</b>	<b>Gunma, Japan</b>
<b>Oct 23-26, 01</b>	<b>The 1<sup>st</sup> Asia-Pacific Conf. on Web Intelligence (WI-2001)</b>	<b>Gunma, Japan</b>
<b>Oct 24-26, 01</b>	<b>8<sup>th</sup> Microoptics Conference (MOC'01)</b>	<b>Osaka, Japan</b>
Oct 25-26, 01	The 2 <sup>nd</sup> International Workshop on Telecommunications (ITST2001)	Kanagawa, Japan

Date	Name	Place
Oct 28–Nov 2, 01	<b>International Conference on Silicon Carbide and Related Materials 2001 (ICSCRM2001)</b>	<b>Tsukuba, Japan</b>
Oct 29-31, 01	<b>JSASS 15th International Sessions in 39th Aircraft Symposium</b>	<b>Gifu, Japan</b>
Oct 29-Nov 2, 01	International Conference on Silicon Carbide and Related Materials - 2001 (ICSCRM2001)	Tsukuba, 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 <sup>th</sup> International Micromachine Symposium	Tokyo, Japan
Oct 31-Nov 2, 01	2001 International Microprocesses and Nanotechnology Conference	Shimane, Japan
Nov 5-9, 01	22 <sup>nd</sup> Asian Conference on Remote Sensing (ACRS2001)	Singapore
<b>Nov 6-9, 01</b>	<b>5<sup>th</sup> International Conference on Durability Analysis of Composite Systems (DURACOSYS 2001)</b>	<b>Tokyo, Japan</b>
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 <sup>rd</sup> International Symposium on Atomic Level Characterizations for New Materials and Devices '01	Nara, Japan
Nov 11-16, 01	9 <sup>th</sup> 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
<b>Nov 13-16, 01</b>	<b>7<sup>th</sup> Japan International SAMPE Symposium and Exhibition (JISSE-7)</b>	<b>Tokyo, Japan</b>
Nov 14-18, 01	The 8 <sup>th</sup> International Conference on Neural Information Processing (ICONIP 2001)	Shanghai, China
<b>Nov 19-21, 01</b>	<b>11<sup>th</sup> International Conference on Composite Structures</b>	<b>Monash, Australia</b>
Nov 20-22, 01	China-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics (NBNI 2001)	Hangzhou, China
<b>Nov 22-24, 01</b>	<b>Artificial Neural Networks and Expert Systems (ANNES'2001)</b>	<b>Dunedin, New Zealand</b>
Nov 25-28, 01	Asia Pacific Symposium on Multi-Dimensional Microscopy 2001	Melbourne, Australia
Nov 26-30, 01	International Symposium on Photonics and applications (ISPA)	Singapore
<b>Nov 27-30, 01</b>	<b>7<sup>th</sup> International Conference on Education and Training in Optics and Photonics</b>	<b>Singapore</b>
Nov 28-30, 01	International Conference on Computational Intelligence, Robotics and Autonomous Systems	Singapore
Dec 2-5, 01	The 10 <sup>th</sup> IEEE International Conference on Fuzzy Systems	Melbourne, Australia
Dec 2-6, 01	10 <sup>th</sup> International Conference on Fracture	Honolulu, HI
<b>Dec 3-6, 01</b>	<b>Asia Pacific Symposium on Multi-Dimensional Microscopy 2001</b>	<b>Melbourne, Australia</b>
Dec 4-7, 01	5 <sup>th</sup> 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 11-15, 01	XI International Workshop on the Physics of Semiconductor Devices	Delhi, India
Dec 15-17, 01	3 <sup>rd</sup> International Symposium on Advanced Energy Conversion Systems and Related Technologies (RAN 2001)	Nagoya, Japan
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
<b>Feb 20-22, 02</b>	<b>Third Australasian Congress on Applied Mechanics</b>	<b>Sydney, Australia</b>
May 15-17, 02	The Seventh World Congress on Biosensors	Kyoto, Japan
<b>May 16-18, 02</b>	<b>Laser Precision Microfabrication (LPM 2001)</b>	<b>Osaka, Japan</b>
May 26-Jun 2, 02	23 <sup>rd</sup> International Symposium on Space Technology and Science	Matsue, Japan
May 28-Jun 1, 02	International Joint Conference on the applications of Ferroelectrics 2002	Nara, Japan
Jun 25-27, 02	International Symposium on Distributed Autonomous Robotic Systems	Fukuoka, Japan
<b>Jul, 02</b>	<b>Topical Workshop in Heterostructure Materials (TWHM'02)</b>	<b>Japan</b>
July 15-19, 02	The International Congress on Plasma Physics, ICPP 2002	Sydney, Australia
21-26 Jul, 02	8 <sup>th</sup> International Conference on New Diamond Science and Technology	Melbourne, Australia
Aug 18-22, 02	Seventh Pacific Rim International Conference on Artificial Intelligence	Tokyo, Japan
215-28 Sep, 02	International Conference on Structural Integrity and Fracture (SIF 2002)	Perth Australia
Nov 5-8, 02	International Topical Meeting on Microwave Photonics (MWP2002)	Hyogo, Japan

Jul 7-11, 03	5 <sup>th</sup> International Congress on Industrial and Applied Mathematics	Sydney, Australia
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## 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
16-27 Jul, 01	Dr. Shigefusa F. Chichibu	University of Tsukuba, Japan	Laser Diodes, Nitrides, Nitrides Characterization, Nitrides Growth & Optoelectronic Materials	4th International Congress on Nitride Semiconductors, ICNS-4 AFRL/MLPS UCSB, Gfoleta, CA
16-27 Jul, 01	Prof. Kazuhiro Ohkawa	Science Technology of Tokyo, Japan	Laser Diodes, Nitrides, Nitrides Characterization, Nitrides Growth & Optoelectronic Materials	4th International Congress on Nitride Semiconductors, ICNS-4 AFRL/MLPS UCSB, Gfoleta, CA
16-26 Jul, 01	Dr. Ikai Lo	National Sun Yat-sen University, Taiwan	Nitrides, Nitrides Characterization, Nitrides Growth & Optoelectronic Materials	AFRL/MLPO
23-24 Jul, 01	Dr. Tae-Yeon Seong	Kwangju Institute of Science and Technology, South Korea	Nitride semiconductors	AFRL/MLPS
2-13 Aug, 01	Prof. Haecheon Choi	Seoul National University, South Korea	Active and Passive Control for Drag Reduction	AFRL/VAAC AFOSR/NA UCLA
14 Aug, 01	Dr. Hiroshi Okada	Kagoshima University, Japan	Analysis of Particulate Composite Materials using a Novel Boundary Element Formulation	AFRL/PRSM
26-30 Aug, 01	Dr. Takashi Yamamoto	Yamaguchi University, Japan	Molecular dynamics simulation of polymer crystallization	Am. Chem. Soc. Conference in Chicago AFRL/MLBP
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
17-22 Sep, 01	Prof. Young-Suk Lee	Chonnam National University, Korea	World Engineering Anthropometry Resource Meeting	Wright State University AFRL/HE
26-29 Sep, 01	Prof. Masatosi Adachi	Toyama Prefectural University, Japan	Dielectric and Piezoelectric Ceramics	AFOSR/NA 10 <sup>th</sup> US-Japan Seminar on Dielectric and Piezoelectric Ceramics, Providence, RI
26-29 Sep, 01	Prof. Noboru Ichinose	Waseda University, Japan	Dielectric and Piezoelectric Ceramics	AFOSR/NA 10 <sup>th</sup> US-Japan Seminar on Dielectric and Piezoelectric Ceramics, Providence, RI
26-29 Sep, 01	Prof. Tadashi Shiosaki	Nara Institute of Science and Technology, Japan	Dielectric and Piezoelectric Ceramics	AFOSR/NA 10 <sup>th</sup> US-Japan Seminar on Dielectric and Piezoelectric Ceramics, Providence, RI

26-29 Sep, 01	Prof. Yoshiaki Uesu	Waseda University, Japan	Dielectric and Piezoelectric Ceramics	AFOSR/NA 10 <sup>th</sup> US-Japan Seminar on Dielectric and Piezoelectric Ceramics, Providence, RI
26-29 Sep, 01	Prof. Takaki Tsurumi	Tokyo Institute of Technology	Dielectric and Piezoelectric Ceramics	AFOSR/NA 10 <sup>th</sup> US-Japan Seminar on Dielectric and Piezoelectric Ceramics, Providence, RI
1-5 Oct, 01	Prof. Noboru Ono	Ehime University, Japan	A New Strategy for Controlling Properties of Benzoporphyrins and Phtalocyanines	AFRL/ML Ohio State University University of Pennsylvania Natick

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