NIMS NOW International

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Special Features: Information Dissemination

Information Dissemination in Materials Science and Research

– Communication Infrastructure and Publication of Results –

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FACE フェイス interview

"Even small stones have their own history and identity."

– The Diverse World of Diamonds, the Pleasures of the World of Science –

Dr. Hisao Kanda, Senior Researcher

Optical Sensor Group, Sensor Materials Center

Information Dissemination in Materials Science and Research
– Communication Infrastructure and Publication of Results –

General Manager, Scientific Information Office
Mikiko Tanifuji

Because of the enormous flood of scientific information these days, it is essential to have a well-designed infrastructure that can capture and organize research information in order to disseminate it effectively, particularly in our digital commons. In addition to this information infrastructure, it has become important to provide scientific communities with open access to research information. In response to this need, we have tried to bring together and support relevant communities on the web, by using new technologies for harvesting, integrating and sharing information through the internet.

The United States and European countries are currently making enormous efforts in the fields of science and technology, while many Asian nations are rapidly acquiring higher technical capabilities. To meet these challenges, Japan's Third Science and Technology Basic Plan proposes the following three key ideas.

- Setting strategic priorities in Science and Technology (S&T)
- Improvement of research environment in S&T
- Well-understanding of S&T to the society

The reinforcement of international information dissemination is considered a part of the proposal that "S&T be supported by society and the public". Based on this proposal, as a part of strengthening its function as a core institute in material science, NIMS not only publishes the results of its own research, but is also strengthening its information analysis capabilities and its communications infrastructure.

We are currently focusing on:

1. Information analysis: Benchmarking of research trends, publication of "Materials Research Outlook", "Element Strategy Outlook", "NIMS 21"
2. A peer-review open-access journal: "Science and Technology of Advanced Materials" (STAM)
3. Web information dissemination: Construction and operation of various websites, including portal sites (e-materials.net) for nanotechnology advanced research (Nanotech Japan), the World Materials Research Institute Forum (WMRIF) site, a support site for female researchers (integrated with human resource database and social network service for utilization of hidden human resources at home), and development of a materials science internet dictionary and semantic associative search engine
4. Database: NIMS Materials Database (see NIMS NOW, Vol. 8, No. 1)

1. Analysis of information: Research trend benchmarking*1

The diversity of citation impact at NIMS and the world

Fig.1 <NIMS> Citation impact for top 5 fields (5 year overlapping periods)

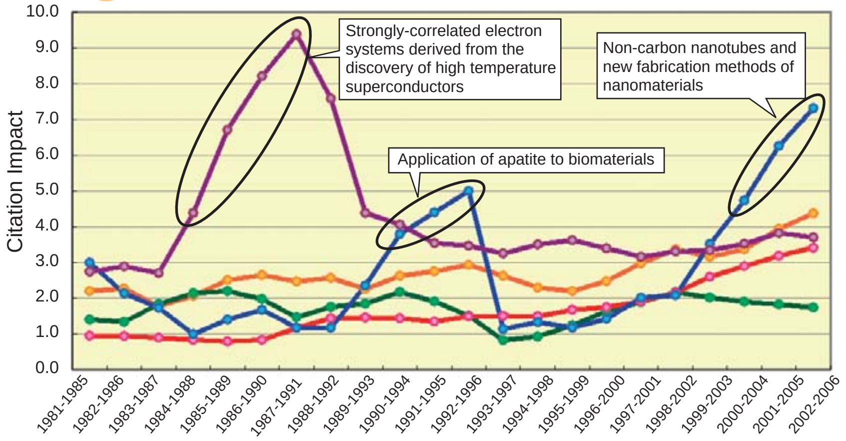
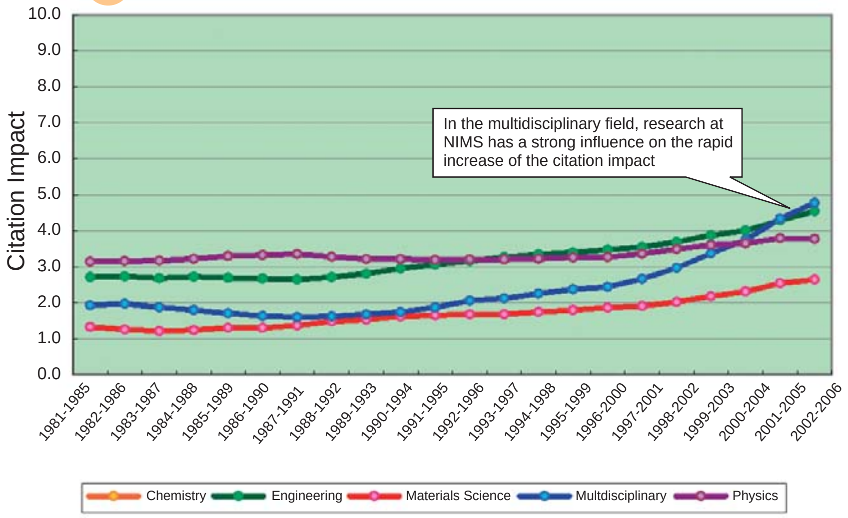


Fig.2 <World> Citation impact for top 5 fields (5 year overlapping periods)



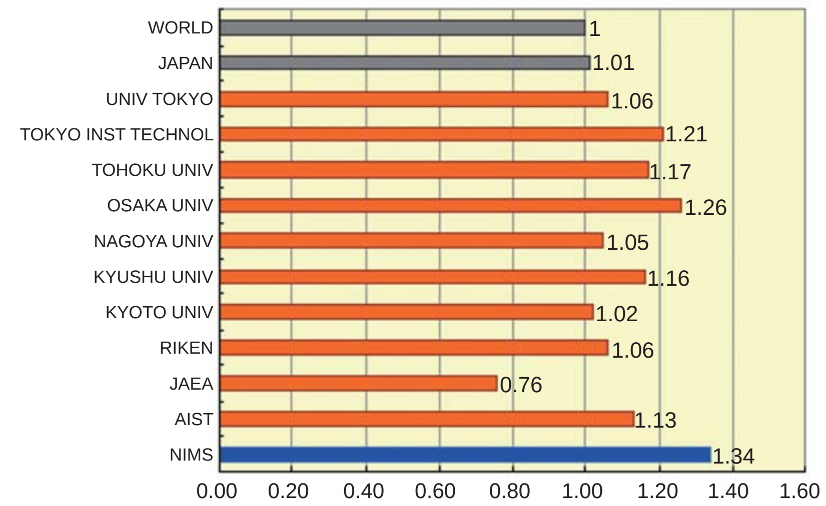
For each institute, having objective knowledge and a quantitative measurement of the influence of its research on global research trends, and of its own unique qualities has become important.*2 Japan's National Institute of Science and Technology Policy and other specialized organizations make comparative evaluations of research activities. However, NIMS and other independent administrative institutions (IAI) must set their own benchmark targets for specific research and development activities, and create systems to improve their research competitiveness as an organization.

Against this background, in 2007, NIMS designated itself, and a number of other institutions in the same field, as objects for benchmarks on a trial basis, and carried out a statistical analysis covering the last 26 years. It is widely recognized that research activities cannot be evaluated adequately by simply using numerical values such as the number of citations or the impact factor*3 as employed by Thomson Scientific. Even in relative comparisons, a variety of approaches (evaluation methods) are possible, the analysis was the first attempt to statistically quantify the relative position and influence of NIMS on a global basis. It should clarify the research fields where NIMS has a strong position and significant influence.

The distinctive features of NIMS obtained as a result of this analysis will be utilized in making future policy, and will also be used to promote public understanding of NIMS as a research institute.

1. 1 Comparison of NIMS and other important research institutes/universities

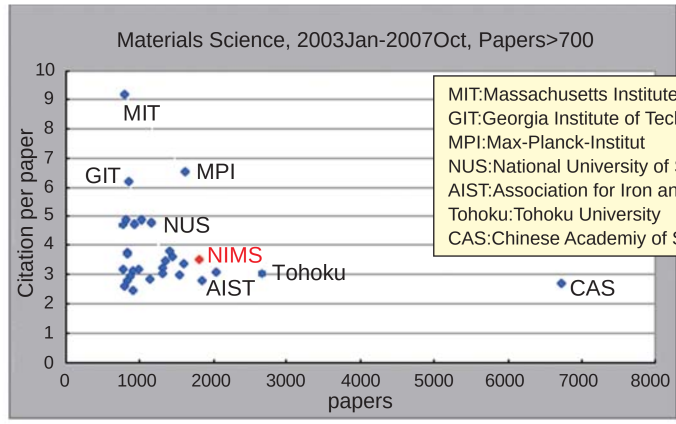
Fig.3 Impact relative: Materials Science and Engineerging (2002-2006)



Based on the classification of journals, (24 main categories, 106 subcategories) by Thomson Scientific, We have selected fields corresponding to the areas of research at NIMS. The impact of published papers for each institution for a 5-year period (2002-2006) was calculated in relative influence (relative impact) values, in which world average impact value is considered to be 1 (the impact base). The impact differed by field. Papers published by NIMS had a large impact on fields such as materials science and engineering and multdisciplinary.

1. 2 Comparison of NIMS and major foreign institutes

Fig.4 Top 30 Institutes in materials science in the world



Knowing its relative position when compared to other of the world's major institutes in the same research field is key information, when it comes to planning specific directions for research activities as a research center in the materials science field. This approach shows the importance of the fact that NIMS is not only publishing a large number of papers, but also produces research results which actually have significant impact worldwide.

*1 The data used here is based on University Science Indicators Japan 1981-2006, Deluxe version, published by Thomson Scientific.
*2 Remarks on science and technology-related activities of Independent Administrative Institutions (FY 2006): http://www8.cao.go.jp/cstp/siryo/haihu71/siryo2-2.pdf [in Japanese].
*3 Impact factor (IF): An index calculated based on the number of citations of papers for a 2-year period; used as a measure of the impact of papers.
Citation impact: Number of citations/Number of papers (Fig. 1, Fig. 2)
Relative impact: Institute impact relative to impact base. Fig. 3 shows a tabulation of the relative impact of Japan and the object institutes based on impact base.

2. Publication of information: English-language journals of materials science, “Science and Technology of Advanced Materials”

The rapid increase in the number of research papers published in recent years, and the sharp rise in the price of journals accompanying this trend, have caused great concern about the means of distribution of research information. A successful method of publication and distribution of papers presenting research results, and the continued access to and storage of this information, is considered to be an essential component of supporting research. In order to contribute to materials science and research, NIMS publishes an international peer-review journal as part of its program to reinforce its function as a core institute.

Science and Technology of Advanced Materials (STAM), which is now in its 8th year, was originally only available by subscription. Starting in January 2008, it has shifted to an open-access model of publication. In response to the increasing trend toward the open-access model, in which authors and supporting institutions bear the cost of publication, NIMS will bear the publications costs of STAM publishing.

Taking advantage of the NIMS network of researchers and related institutions, the following features make STAM distinctive from other science and engineering-related journals, of which there are now more than 5,000 published worldwide.

1) High quality paper review system by international editorial board and reviewers
2) Editorial support by the World Materials Research Institute Forum (est. 2005)
3) International distribution network of NIMS
4) Editorial office staffed by full-time researchers and a publisher

Taking advantage of these features, which only NIMS can provide, the objective is to publish only papers (review papers, regular papers) which have passed a rigorous, impartial review process, with financial support by NIMS.

The following changes have been made accompanying adoption of the open access system:

- The journal format is now limited to online publication URL from 2008: http://www.iop.org/EJ/journal/stam (The former URL for subscribers up to 2007 will be continued on ScienceDirect.)
- Publication of paper collections by subject will be provided by on-demand printing

The publishing of STAM papers in bibliographical databases such as Web of Science (Thomson Scientific), SCOPUS (Elsevier), INSPEC (IEE), CrossRef, and others, will continue. In order to enhance its distribution capabilities for its papers and to improve its service to the authors and the readers, and with the aim of further strengthening the impact of its papers, we have also welcomed a new publishing partner, the Institute of Physics (IOP) in the UK, which has a successful achievement of impact on open access journals in physics.

■ Top papers published in 2006/2007

Highly-cited papers

- Control of texture in alumina by colloidal processing in a strong magnetic field, by Suzuki, T. S. et al. (Vol 7, 2006, p. 356)
- Gold nanoparticle-based novel enhancement method for the development of highly sensitive immunochromatographic test strips, by Nagatani, N. et al. (Vol. 7, 2006, p. 270)

Most downloaded papers

- Nanotechnology and the environment: A European perspective by Rickerby, D. G et al. (Vol. 8, 2007, p. 19)
- New families of mesoporous materials, by Vinu, A. et al. (Vol. 7, 2006, p. 753)

3. Integration of information and strategic dissemination: Japanese nanotechnology portal site “NanotechJapan”

As a part of the “nanotechnology network” project, commissioned by Japan’s Ministry of Education, Culture, Sports, Science and Technology (MEXT), this portal site aims to integrate information on advanced research in nanotechnology in Japan and related information, and to actively provide this information to society. In addition to forming an information sharing network linking to 13-selected research centers, this site aims to incorporate the originality and interactive features operated by NIMS.

http://www.nanonet.go.jp

Policy and research center news

Aimed at researchers in the field of nanotechnology throughout Japan, nanotech experts collect and edit news on policies and current events under the heading of “Nanotechnology in Japan.”

NanotechJapan Bulletin

A web magazine devoted to nanotechnology. It is edited and published under a broadly-based editorial board. The board is comprised of people from industry, from governmental departments and from academic institutions. Its chief editor is Dr. Hiroyuki Akinaga of the National Institute of Advanced Industrial Science and Technology, AIST, and the journal is published bimonthly. In both Japanese and English-language versions are published in rotation, and it contains articles on research trends in Japan and in other countries, review articles, translations of published reports, etc.

Interviews with young researchers

A forum where both young researchers and support personnel (post-docs, technicians, etc.) at research facilities can introduce themselves and express their views. These young people will undoubtedly be responsible for the future of advanced research. This forum will provide flexibility in human resources by giving these young people a platform through which their voices can be heard.

若手研究者インタビューリレー

4. Other information distribution support

Female researcher support, utilizing hidden human resources

This project has four pillars,
(1) to actively seek the employment of women,
(2) to review their methods of work,
(3) to provide support for childcare,
(4) to raise awareness of women’s issues in the workplace.

In this project, the role of information distribution is to integrate the information available on the internet, so as to support the utilization of human resources from diverse environments, and to give opportunities for women to return to work. Currently, development is underway on a unique information distribution site in which the following two functions are to be integrated.

- Social networking: to share difficulties and experiences to enhance satisfaction for women at work, and to exchange information obtained from the network.

人なび となりの科学室

- Human resources database: to support the matching of job-seekers and employers.

Trial operation is scheduled to begin in March 2008.

The aim is to disseminate useful information for both men and women, by providing a place to exchange ideas on how to raise children and do research at the same time. By establishing a network which is not limited to NIMS, its goal is to extend information coming from the community in Tsukuba to everywhere in Japan.

This project was introduced in NIMS NOW, Vol. 5, No. 9:
http://www.nims.go.jp/eng/news/nimsnow/Vol7/No9/face.html

World Materials Research Institute Forum

Parallel with a conference which brought together the 34 heads of the world’s leading materials research institutes from 21 countries around the world, information exchange and discussions are carried out over the internet. Specifically, research institutes become network members, and this system provides interactive web functions such as forming working groups, holding discussions, and sharing information on organizations’ facilities, research projects, etc.

NIMS focus on information dissemination in diverse situations. We are working to enhance our information communication infrastructure, which has the distinctive features of originality and specialization. Activities in 2008 in particular, will center on a development of “digital repository” in materials science as a pioneer in research institutes in Japan.

物質材料研究のための e-materials.net

A community network for materials research.

Composites and Coatings Center

Fail-Safe Hybrid Materials Project

Polymer-based Hybrid Composite Materials Preventing Instantaneous Failure

Composite Materials Group, Composites and Coatings Center

Kimiyoshi Naito

In recent years, ensuring the safety of structures has become a focus of concern as a socially important issue, particularly in connection with earthquake damage and age-related deterioration of plants, bridges, and other infrastructure that was constructed during Japan's high growth era roughly 40 years ago. From the viewpoint of energy efficiency, further weight reduction will be required in transportation equipment in the future. The conventional materials for these applications are metals, ceramics, and polymers. However, rather than simply using these materials independently, one effective approach to creating materials that respond to advanced requirements is the development of composites at a more micro level. In particular, the nanotubes and nanoparticles developed in recent years have a variety of properties that surpass those of conventional materials, and practical application of these in composites is still only beginning.

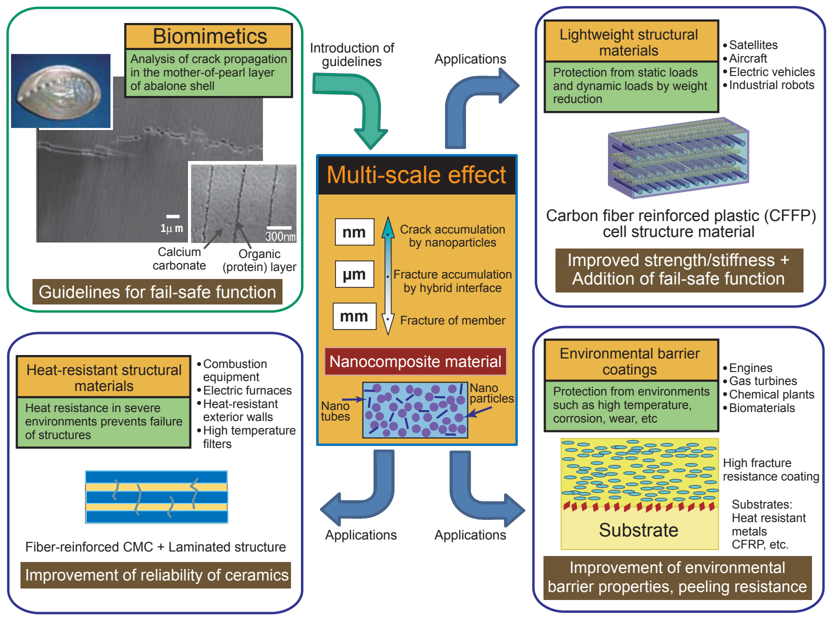
Generally, "fail-safe" means a design mechanism which ensures that damage does not spread when a certain system element "fails," and the system is forced to fall into a predetermined "safe" condition. In the Composites and Coatings Center, we refer to the capability to support a load for a certain time, even after a structure begins to fail, as a "fail-safe function." The aim of our research is to realize this fail-safe function at the material level. How long a structure can stand firm in this manner, against how large a stress, is an index for measuring the fail-safe function. If a structure has this fail-safe function, it should be possible to detect the abnormality before ultimate failure, and to evacuate or repair the structure.

As materials to demonstrate the validity of this concept, as shown in the accompanying figure, we are engaged in research on carbon fiber reinforced plastics (CFRP), ceramic matrix composites (CMC), and environmental barrier coatings (EMC). We are applying various techniques to cause branching in crack propagation when materials undergo fracture and incorporate sliding behavior at the interface between different materials so as to increase the amount of deformation before rupture, for example, by mixing strengthening particles or fibers of different size levels from nm to μm and mm (multi-scale effect), creating multi-layer laminated materials using the composite materials produced in this manner and dense metals or ceramics, and other novel approaches.

In addition, in the natural world, there are materials with high specific strength and high toughness not yet achieved in artificial materials. One well-known example is the shell of the abalone, which has a unique microstructure in which microscopic calcium carbonate crystals are bonded by organic layers. When an abalone shell is struck, it has a mechanism that absorbs energy by fracturing at multiple points at the nm and μm level. This is why we are extremely interested in the principle called biomimetics, in which we try to mimic this type of outstanding natural structure.

Although our research is still at the stage of demonstrating these concepts, we are working to produce results in the form of material technologies that can contribute to society at the earliest possible date.

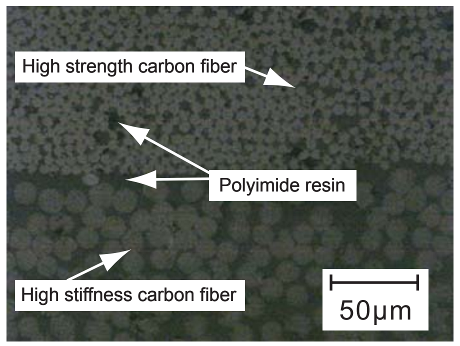
Fig



Concept of the Fail-Safe Hybrid Materials Project. While taking living organisms as one model (upper left), nanocomposite materials and hybrid materials created by hybridization of these materials with dense metals and ceramics will be applied to the three fields shown here. These materials can be expected to manifest fail-safe functions as a result of the crack accumulation effect of nanoparticles in composite materials, and strengthening/toughening by fracture accumulation at the interface between heterogeneous materials in hybrid materials.

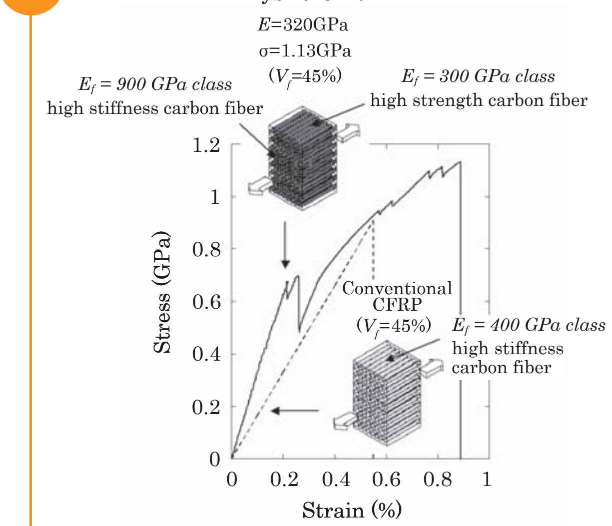
Carbon fiber reinforced plastics (CFRP) are now used for the fuselages and wing structures of aircraft, and total consumption has increased dramatically. These polymer-based composite materials will also be applied to the next generation of automobile structures. These structures must be exceptionally reliable and have a fail-safe design to prevent instantaneous failure that could cause fatal accidents, and so the CFRP used in these structures requires advanced functions such as the ability to withstand high-temperature environments. Therefore, we are developing a CFRP using the heat-resistant polymer, polyimide resin. Voids occur during the manufacturing of polyimide-based composite materials, making it difficult to fabricate such composite materials. To solve this problem, we examined the manufacturing process and succeeded in fabricating a polyimide-based CFRP without voids. We have also started to develop a hybrid composite material. **Fig. 1** shows a cross-sectional optical micrograph of the hybrid composite material, which consists of high-strength, high-stiffness carbon fibers and a polyimide resin. **Fig. 2** shows a stress-strain curve under tensile test for the hybrid composite material. The characteristic of the stress-strain curve is not the fracture strength and failure strain of the hybrid composite material but the shape of the stress-strain curve caused by the fail-safe function. For a conventional CFRP, which consists of only one kind of carbon fiber, the stress applied to the composite material is almost linearly proportional to the strain and the composite material fails suddenly when the stress reaches a critical value (broken line in **Fig. 2**: conventional CFRP). However, for the hybrid CFRP, which is made of two kinds of carbon fibers, i.e., a high-stiffness fiber and a high-strength fiber, the stress-stain curve shows a complicated shape. The high-stiffness fiber gives the hybrid composite material high stiffness during the initial stage of loading, as shown in **Fig. 2** (elastic modulus E = 320 GPa at volume fraction of fiber V_f = 45%). Subsequently, when the high-stiffness fibers begin to fail, the high-strength fibers withstand the load (strength) and the material continues to support the high load without instantaneous failure. The fracture stress σ of this material is as high as 1.13 GPa. Because higher strength fiber can help support the load for a certain time after a failure occurs, this material is one example of a polymer-based hybrid composite material possessing fail-safe functionality.

Fig.1



Optical micrograph of cross-sectional view for the hybrid carbon fiber reinforced plastic (CFRP), which consist of high strength, high stiffness carbon fibers and a polyimide resin.

Fig.2



Stress-strain curve for Hybrid CFRP

E : elastic modulus of composite material
E_f: elastic modulus of carbon fiber
σ : fracture stress of composite material
V_f: volume fraction of fibers in composite material

Realizing Nonlinear Optical Devices on Silicon

- A Step toward Hybrid Silicon Photonics -

Frequency Conversion Group, Optronic Materials Center
Waseda University†

Sunao Kurimura, Hirochika Nakajima†

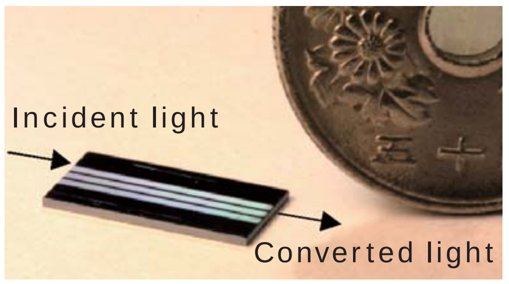
With high integration of semiconductor integrated circuits, the time lag in data transmission due the capacitance (electrostatic capacity) of the electrical wiring has become a problem. An optical wiring technology that does not cause time lag is desired in fine wiring with a linewidth of 0.2μm and under. Therefore, there is a heightened trend, centering on the world's largest semiconductor manufacturer, Intel, toward introduction of optical wiring in silicon electronic circuits, aiming at application to wiring in chips and boards. Intel refers to this technology as silicon photonics, and is energetically continuing development. However, it was extremely difficult to realize, on silicon, the nonlinear optical devices which are used in wavelength division multiplexing (WDM) in optical wiring. This is due to the fact that efficient second-order nonlinear optical effects cannot be realized with the structure of the silicon crystal.

In this research, our group produced the world's first secondary nonlinear optical device on a silicon substrate (**Fig. 1**) and succeeded in increasing its laser wavelength conversion efficiency to approximately 7% (**Fig. 2**). The device uses magnesium-doped lithium niobate (Mg:LN) as the wavelength conversion material. A planar waveguide was produced by bonding Mg:LN and a silicon single crystal, followed by polishing. A periodically-poled structure was formed to improve wavelength conversion efficiency. The device was then defined to a rectangular shape by etching, leaving part of the material, thereby forming a ridge waveguide (**Fig. 3**).

It is expected that optical relay functions such as all-optical switching between channels with different wavelengths, waveband conversion of different bands, and similar functions can be built in one chip. Application to next-generation quantum communications, which offer the ultimate in security, is also being studied, and application to quantum computers and other technologies can be expected. It is also expected to be possible to realize an ultra-compact laser by integrating a semiconductor laser and electronic circuit on silicon.

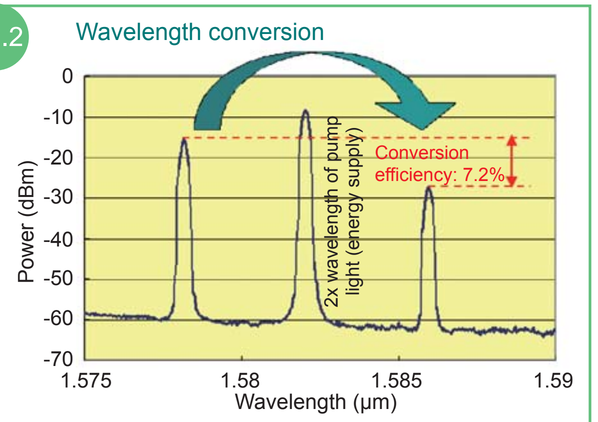
This research was partially funded by the commissioned research project, "Research and development of quantum control optical modulator/demodulator (MODEM) technology" of the National Institute of Information and Communications Technology. It also received the Presentation Encouragement Award of the Japan Society of Applied Physics.

Fig.1



Nonlinear optical device on silicon

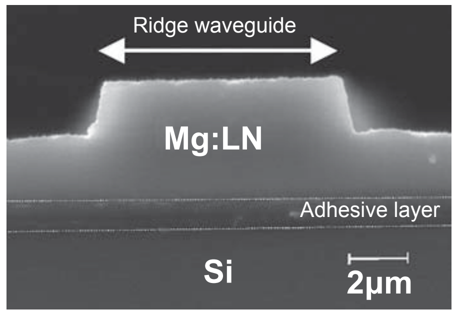
Fig.2



- Pump wavelength: 0.791μm
- Conversion from wavelength 1.578μm → 1.586μm with efficiency of 7.2%

Wavelength conversion in optical communication band

Fig.3



Scanning electron microscope image of ridge waveguide

Development of Zinc Oxide Wide Bandgap Semiconductor Wafer

Opto-Electronics Group, Optronic Materials Center
World Premier International Center for Materials Nanoarchitectonics (MANA)
Mitsubishi Gas Chemical Co., Inc.†

Managing Director
Jun Kobayashi†, Hideyuki Sekiwa†, Naoki Ohashi, Isao Sakaguchi

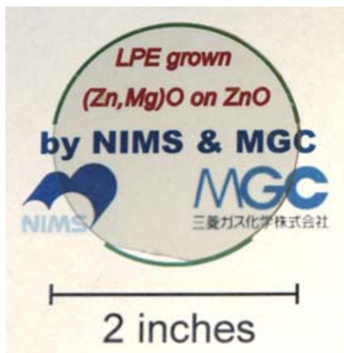
Zinc oxide (ZnO) has attracted attention as a representative wide bandgap semiconductor, and research and development aiming at its application to optical/electronic devices is underway worldwide.

In order to use ZnO in electronic devices and light emitting devices, high quality crystals (wafers) are necessary. Furthermore, additives are also necessary in order to give functions to wafers. For example, if part (on the order of 0.01-0.1%) of the Zn in the crystal is replaced with aluminum, the crystal will display electrical conductivity, and the width of the bandgap can be expanded by partial replacement of Zn with magnesium. NIMS and Mitsubishi Gas Chemical jointly developed a technology for obtaining high quality ZnO based wafers (**Fig. 1**) while controlling the width of the bandgap and conductivity using the liquid phase epitaxy (LPE) technique.

The principle and outline of the LPE process are shown in **Fig. 2**. In much the same way that table salt is crystallized out of saturated salt water, this is a method in which the source material is dissolved in a flux that melts at high temperature, and the object crystals are deposited on a substrate in contact with the melt. Because ZnO vaporizes rather than melting when heated to high temperature, the LPE process, which used a low melting point solvent, is an effective crystal growth method. By optimizing composition and concentration of the additives dissolved in the solvent and carefully examining the conditions for deposition on the ZnO substrate, we developed the basic technology for obtaining ZnO alloy [(Zn,Mg)O:Al] wafers having the desired concentrations of magnesium and aluminum. In the future, we plan to establish a technique for removing the substrate after growth and develop free-standing ZnO based semiconductor wafers.

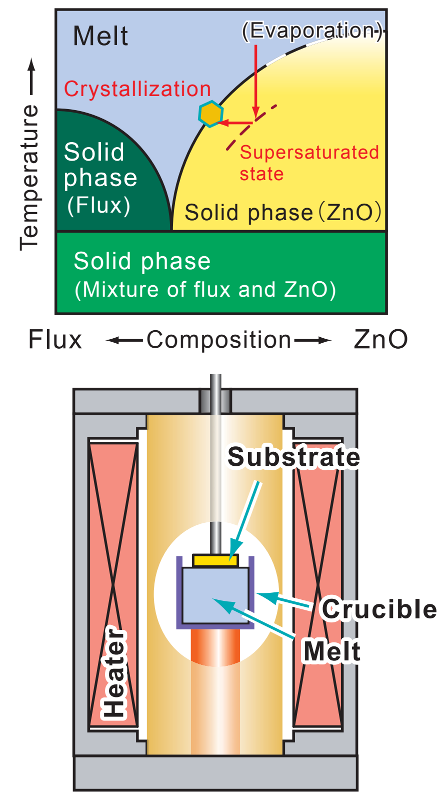
The developed technology for obtaining wafers which have an expanded bandgap, transparency with respect to visible light to near ultraviolet light, and controlled conductivity is considered to be the basis for obtaining light emitting devices and transparent electronic devices, and is expected to contribute to acceleration of technical development related to ZnO.

Fig.1



A thick film (up to 50μm) of a (Zn,Mg)O layer has formed on a polished sample ZnO substrate.

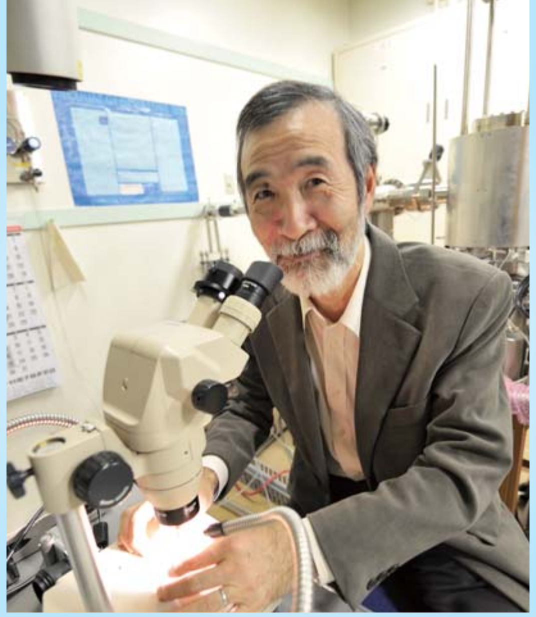
Fig.2



Outline of the principle and furnace for crystal growth using a flux

F/A/C/E フェイス interview

Dr. Kanda's favorite quote, "Even small stones have their own history and identity," is the title of a book which was written by his mentor. Dr. Kanda says, it's so much fun to consider why diamonds have various forms, as each one is always different. For many years, Dr. Kanda has led youngsters' science activities in NIMS open houses in order to generate interest in science and to develop their knowledge and skills. His experiment programs are always filled with participants as diamonds are very popular materials. NIMS NOW asked Dr. Kanda about his fascination with diamonds and the excitement of research.



Dr. Hisao Kanda, Senior Researcher
Optical Sensor Group, Sensor Materials Center

"Even small stones have their own history and identity."

– The Diverse World of Diamonds, the Pleasures of the World of Science –

Did you begin your research on diamonds after you joined the National Institute for Research in Inorganic Materials (a predecessor of NIMS)?

I've always loved to pick and collect rocks. And I'm very fascinated with the crystal shapes in minerals. At the National Institute for Research in Inorganic Materials, I belonged to a lab for the occurrence of carbon, and later, started research on diamonds there. This was a perfect match with my personal interests because diamonds also form in crystals. I've continued this research for around 30 years now.

What is the attraction of research on diamonds?

Since antiquity, people have loved and dreamed of diamonds as "the king of gemstones." Also, diamonds are known as the hardest natural material and have the highest thermal conductivity. Considering these excellent features, I think that diamonds are the most unique material.

I've carried out experiments on diamond synthesis for many years, and the diamonds I've produced have a large variety of features. The diversity of shapes, such as square, long or slender is also interesting. I'm curious about why diamonds form such a variety of shapes, even though they all have the same atomic arrangement. Differences occur depending on the environment in which diamonds are formed, but this still holds many mysteries.

What kind of research did you do?

I was in charge of the synthesis of single crystal diamonds using a diamond synthesis device which my seniors at the National Institute for Research in Inorganic Materials had developed as a result of much accumulated hard work. First, because I was interested in crystal morphology, I did research on the growth of large-scale crystals. This was followed by research on color control by enhancing quality. Diamonds may seem to be colorless and transparent, but in actuality, they have a variety of colors due to differences in the impurities they contain. Nitrogen and boron are typical impurities, but other impurities are extremely difficult to introduce. This means it's very hard to produce various colors. At present, we've produced five types, these being colorless, yellow, blue, green, and brown. Pink diamonds also exist in nature, but we don't know how these are formed.

What can you say about the future of research on diamonds?

The applications of diamonds include gemstones, tools, and electronic materials. NIMS is engaged in research aimed at use in diodes and sensors as semiconductor electronic materials. However, the potential for other applications also exists. I am currently interested in impurities and defects in diamonds, but advanced control of impurities is the basis of various applications. Actually, there are researchers who are investigating diamonds as a potential material for quantum computers, provided advanced control of impurities is possible. Also, because diamonds are composed of carbon atoms, they are considered to have good biocompatibility, which means application to bio fields can also be expected.

Over the years, you've also been active in events for children.

I've been involved in NIMS educational events for more than 10 years. Beginning with cooperation based on the fact the diamonds are the easiest material for the average person to understand, we've gradually expanded these activities. Of course, it's interesting to see the children's eyes sparkling and their surprised reactions. Through these activities, I hope to popularize science as a part of culture. Recently, the value of science has frequently been driven by its contribution to technology and industry, but I believe that the social contribution of science familiarization is also important. To have knowledge and to discover, these are impressed on the participants by those experiences. I want them to understand that science has pleasures just like music and painting.

Junior high school students participating in a diamond combustion experiment in the "Ibaraki Prefecture Mini-doctor Program"

NIMS NEWS

Roundtable Discussion with Representatives of the Society of Chinese Professors in Japan and Prime Minister Fukuda

(December 27, 2007) – Immediately before his first visit to China since taking office, Prime Minister Fukuda held a roundtable discussion on "Construction and Development of a Mutually-Beneficial Strategic Relationship between China and Japan" with 12 representatives of the Society of Chinese Professors in Japan, an influential group which is active in various fields of education and research in Japan.

Prime Minister Fukuda and 12 representatives of the Society of Chinese Professors in Japan. From NIMS, Managing Director Jinhua Ye of the Photocatalytic Materials Center is the second person on the Prime Minister's right, and Group Leader Xiaobing Ren of the Sensor Materials Center is the fourth on the right.

Two Chinese researchers from NIMS also participated in this meeting, which was held at the Prime Minister's official residence. Using materials of the Council for Science and Technology Policy, Managing Director Jinhua Ye of the Photocatalytic Materials Center and Group Leader Xiaobing Ren of the Sensor Materials Center reported on internationalization efforts at NIMS, which is the core research institute in materials technology supporting high technology in Japan, and in particular, on the current status and achievements of joint research and exchanges of human resources between China and Japan.

At the 30 minutes roundtable, proposals were made for the strategic development of the China-Japan relationship and active promotion of exchanges from a number of directions, including exchanges at the intergovernmental and private sector levels and cooperation in education and research in various fields, and ideas were exchanged on a wide range of subjects. The discussions were held in a friendly atmosphere throughout. Prime Minister Fukuda showed keen interest in the ideas of the participants, and he himself took notes as he listened.

Opening Ceremony of NIMS Office at the University of Cambridge

(November 7, 2007) – The NIMS Office at the University of Cambridge, which was opened on October 2, 2007 as a base for research cooperation and collaboration, had an official ceremony to sign a visitor's agreement in Japan.

Prof. Humphreys Greeting at the Opening Ceremony

Prof. Colin Humphreys from the University of Cambridge, Dr. Edward Wright from the British Embassy, Mr. Richard Thornley, the Rolls-Royce regional director for Japan attended the ceremony along with many NIMS delegates, including the President Prof. Teruo Kishi, Vice-Presidents, Auditors, members of the High Temperature Materials Center and Rolls-Royce Center of Excellence for Aerospace Materials.

Aircraft engine efficiency is an extremely important issue from the viewpoint of resource saving and reduction of CO_2 emissions. Research and development of the high temperature materials for aircraft engine application is the key to enhance the engine efficiency. The NIMS Office at Cambridge University has been opened to function as a new research center for this work.

A news item on the opening ceremony at the University of Cambridge in October was on NIMS NOW November issue (Vol. 5, No. 11, 2007). http://www.nims.go.jp/eng/news/nimsnow/Vol5/No11/news1.html#news002

Prof. Kishi Visits 3 Institutes in Taiwan

(November 2007) – Prof. Teruo Kishi, President of NIMS, visited three of Taiwan's representative science and technology institutes to deepen friendships with them. First, at the conference of the Taiwan Materials Research Society, which was held at the National Chiao Tung University (NCTU), Prof. Kishi gave a keynote address on nanotechnology/materials programs in Japan and the activities of NIMS. Following this, he signed a Sister Institute Agreement with NCTU, held discussions with Vice President Chia-Hoang Lee and researchers, and toured the university's laboratories. Next, he visited the Academia Sinica, where he also signed a Sister Institute Agreement, held talks with President Chi-Huey Wong and the top leaders of the institution, and toured the Institute of Physics and Institute of Chemistry. Finally, he visited the National Science Council (NSC) and exchanged information and views on science and technology policy with Chien-Jen Chen, Minister of the NSC, and other key persons.

At the Academia Sinica

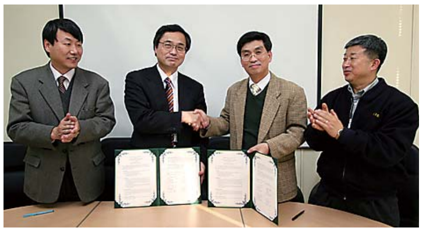
NIMS Signed an MOU with Brazil's Federal University of Rio de Janeiro

(December 11, 2007) – The NIMS Superconducting Materials Center signed a memorandum of understanding (MOU) for cooperation in connection with "Research on magnetism and superconductivity" with the Institute of Physics, Federal University of Rio de Janeiro (IF-UFRJ). The IF-UFRJ is a research center of the federal university located in Rio de Janeiro, Brazil. Rio is famous for its Carnival. Brazil is one of the four nations in the so-called BRICs, which have achieved remarkable economic growth in recent years, and also has a deep relationship with Japan, as Brazil is the home of many Japanese descent immigrants. This is the second MOU that NIMS has signed with a university in South America, following one with the University of Chile. A deepening of human exchanges and research cooperation is expected in the future.

From the left: Dr. Takeya, Senior Researcher, Dr. Kumakura, Managing Director of the Superconducting Materials Center, Prof. Massalami of the IF-UFRJ, and Dr. Hirata, Group Leader, Superconducting Materials Center.

NIMS Signed an MOU with the Korean Institute of Energy Research (KIER)

(December 14, 2007) – The NIMS Nano Ceramics Center signed a memorandum of understanding (MOU) on joint research with the Future Fundamental Technology Research Department of the Korean Institute of Energy Research (KIER). KIER is located in a "research park" (area similar to the Tsukuba Research Park) in Daejeon City in the central part of Korea, and is a national research institute focusing on system and process development in the field of new energy, as well as related materials development. The Future Fundamental Technology Research Department consists of 5 centers, including the Convergence Energy Materials Research Center, and is engaged in active research on structural and functional ceramics, composite materials, and nanomaterials.



From the left, Dr. Byung-Koog Jang, Senior Researcher, Dr. Yoshio Sakka, Managing Director of the Nano Ceramics Center, Dr. Yeong-Su Ahn, Director of the Future Fundamental Technology Research Department, and Dr. Sang-Kook Woo, Senior Researcher, Convergence Energy Materials Research Center.

The signing of this MOU is expected to deepen cooperation in international joint research, exchanges of human resources, the holding of joint workshops, and other activities. Examples of this include research in connection with the development of coating technologies for metal separator plates for polymer electrolyte fuel cells and a visit to KIER by NIMS researchers in the Nano Ceramics Center scheduled for mid-March of this year. A joint workshop on the development of new ceramic materials is also planned.

Hello from NIMS

¡¡Hola a todos !!(Hello to everybody!!)

I arrived at Japan in spring, two suitcases and a daughter in the arms as a life luggage. Soon two Japanese ladies helped me to find my way in Tokyo station (thank you!!), my shinkansen was leaving to Tohoku. There, right away I was seduced by the beauty of forests and mountains, especially in Yamagata prefecture. Now, looking forward to enjoying my 10th hanami (cherry blossom), I can hardly conceive how something that started as an adventure in the exotic orient has become a different life.

I was born in the Mediterranean; I grew up near Madrid, in a valley town surrounded by pine-trees and mountains to the north and olive-trees and flat land to the south. In the 90's, I lived in Germany at the borderline between East and West Europe during those avid years of reunification after the fall of the Berlin wall. This was a great experience while studying Physics at the Technical University of Berlin. After this I moved to Japan.

I came to Tsukuba three years ago, after doing my PhD and a postdoc in Tokyo. During my stay in Japan, in spite of the cultural gap, I found similarities that felt very familiar. So far our languages are etymologically, so near phonetically; the same five vocals (a,i,u,e,o) and syllables that we can write<->pronounce (with confidence!!). The joy of sharing with friends a Japanese little dishes course resembles the Spanish "salir de tapas" (outgoing for tapas), …… But above these are the new habits … ..so writing these words while drinking a green tea, I recall once arriving at Narita, my little daughter soon recognized that we were back home and exclaimed "Mama, let's go to onsen!!", I replied her "yes, let's go to a hot spring (with a nice view to nature!!), and shabu-shabu (beef dish), and kaiten-sushi"….

Encarnación G. Víllora (Spain)
Period of Stay at NIMS: 3 years
Senior Researcher,
Frequency Conversion Group,
Optronic Materials Center

[At the day of undoukai (sports festival).
It's the main childrens-parents event hold every year starting from nursery time.]

National Institute for Materials Science

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