from Tsukuba, Japan to the world

NIMS NOW

National Institute for Materials Science

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SPECIAL FEATURES

Data Accumulation, Database Creation, and International Standardization Activities

Structural Materials Data Sheets

—Four series of data sheets for structural material properties—

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Deputy Director General
Materials Information Technology Station (MITS)

Metal materials are used in all types of machinery and structures, taking advantage of their strength. However, to ensure safety in these applications, metals must also possess various properties other than strength. For this reason, MITS prepares and publishes four series of data sheets, on Creep (gray), Fatigue (green), Corrosion (orange), and Space Use Materials (sky blue).

Creep is a phenomenon in which metals gradually elongate when acted on by force under high temperatures, and is a problem for safe operation of high-temperature facilities such as thermal power plants. Fatigue, on the other hand, is a phenomenon in which metals crack when subjected to cyclical loading by small forces, and is a problem in a wide range of machinery and structures, including automobiles, bridges, and buildings. Corrosion is typified by rust on steel and affects highways and buildings, particularly in coastal areas. Finally, "space use material" refers to the titanium alloys and nickel-based superalloys of the type used in Japan's H-IIA rocket. NIMS is investigating the strength and fatigue properties of these materials at cryogenic temperatures in order to accumulate data for use in rocket design.

Fig. Data sheets for 4 fields of structural materials.

The NIMS Corrosion Data Sheet and Space Use Materials Data Sheet are relatively new, with first issues published in 2002. The Creep and Fatigue Data Sheets have long histories, now approaching 40 years, and both series include around 100 volumes.

For design of high-temperature machinery, creep tests must be conducted continuously over a period of 20-30 years. Some creep test pieces at NIMS reached the 30 year mark in 1999, setting a Japanese record. In fatigue testing, conventional tests had been terminated at 10 million cycles of stress, but with high-strength spring steel and certain other materials, cracking phenomena are observed even in tests exceeding 10 million cycles. Therefore, in recent years, 10 gigacycle (10 billion cycle) tests have been used with these materials, requiring as much as 3 years. Considering this, NIMS Creep and Fatigue Data Sheets are used in equipment/structural design and maintenance and standards of various types, and have won an excellent reputation. < Continued on p.4

NIMS NEWS

NIMS Signs General Agreements with Two Institutes in Chinese Academy of Sciences

NIMS has concluded General Agreements on Comprehensive Research Cooperation with China's Institute of Physics (IOP) and Institute of Metal Research (IMR), both members of the Chinese Academy of Sciences (CAS). During a recent visit to China, Prof. Kishi, President of NIMS, signed the agreements with Prof. Wang, Director of IOP, in Beijing on May 26 (see photo, p.3) and with Prof. Lu, Director of IMR, in Shenyang on May 27 (lower photo). < Continued on p.3

In this issue

Developing Intellectual Infrastructure for Materials

—NIMS Materials Database on the Internet—

Masayoshi Yamazaki
Materials Database Group
Materials Information Technology Station (MITS)

NIMS recently made the world's largest materials database system NIMS Materials Database available via the internet, contributing to "Improvement of intellectual infrastructure," which is one objective of the NIMS Mid-Term Plan. NIMS' goals in this area include preparation of data sheets on structural materials and development of materials databases (DBs).

Under the basic principle, "DB is of value only when they are really used," the Materials Database Group is taking advantage of information technology (IT) to give users improved access to basic information on materials. The Materials Database Group assumes responsibility for the 6 high-performance materials DBs developed by the former Japan Science and Technology Agency (JST; reorganized as an independent administrative institution in 2003), and also consolidates and reconstructs them together with the 5 materials DBs developed by NIMS to create the NIMS Materials Database, which was opened via the internet in April 2003. These DBs are important resources not only for material development, material's appropriate application and selection of optimum materials, but also for prediction and comparison of material properties and material identification (dictionary function). There is no charge for searching/referencing NIMS Materials Database, but users are required to register. By the end of April 2004, NIMS Materials Database had 12,048 registered users, including 2,805 non-Japanese. About 60 % of the users are researchers or engineers in private-sector companies.

Fig. 2 shows the webpage of NIMS Materials Database. The search system Mat Navi (**upper left**) enables a horizontal search of 8 DBs, by material or property, using categories and keywords.

While this is the world's largest material-related academic numerical database system, it represents only a small fraction of the information on materials available worldwide. Therefore, NIMS and Granta Design Ltd., a venture company of Cambridge University in the U.K., jointly developed a system which enables horizontal search of data over materials DBs at the world's leading research institutes by linking to Granta's Material Data Network. (The system can be accessed at http:matdata.net).

DBs are developed by being used; on the other hand, to attract users, the data must also be as complete as possible. To help us improve our service, any user who discovers that desired information is not included in our DBs please contact us at the following address. As this will provide us with valuable information for understanding our users' needs, your cooperation will be most appreciated.

[Mail address for inquiries: matdb@ayamegusa.nims.go.jp]

DB name	Content
Structural Materials	Creep, fatigue
Nuclear Materials	Nuclear transmutation, neutron irradiation
Pressure Vessel Materials	Strength characteristics of Cr-Mo steels
Welding	CCT diagrams for welding
Polymer [PoLyInfo] →NEW	Properties, dictionary function
Basic Crystal Structures	Crystal structures, X-ray diffraction
Electronic Structures	Electronic structures, element properties
Diffusion	Diffusion coefficient, diffusion constants
3-D Demo System for Ternary Phase Diagrams	phase diagrams of 5 systems
Superconducting Materials	Properties of superconductors
High Magnetic Field Engineering	Properties under cryogenic temperatures

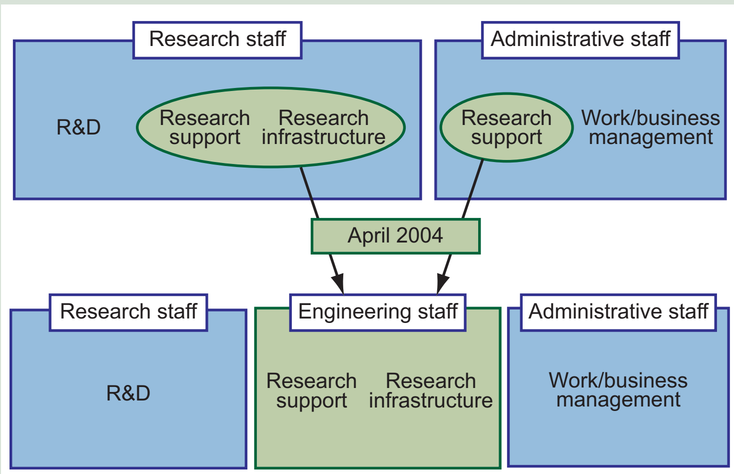
Fig. 1 Outline of Materials DB.

[http://mits.nims.go.jp/db_top_eng.htm]

Fig. 2 Webpage of NIMS Materials Database

Creation of New Engineer Job Classification in NIMS

Effective April 1, NIMS created a new position of engineer to support research activities and research infrastructure. Engineer positions will include jobs involving database and data sheet creation, commissioned analysis work, and operation/control of common information equipment, analysis equipment, large-scale facilities, and fabrication/production equipments. Because these jobs are essential to the research infrastructure, strengthening this area is indispensable for achieving NIMS' goals under the Mid-Term Plan. To date, personnel engaged in these types of work have been divided between administrative and research staff, and the personnel system was not necessarily appropriate from the viewpoint of hiring, evaluation, and compensation. Establishment of the new engineer job classification, in addition to the existing research and administrative classifications will allow proper evaluation and compensation of staff responsible for research support and research infrastructure. The move is expected to create a stronger foundation for research in NIMS.



Fatigue Data Sheets

Koji Yamaguchi
Fatigue Group
Materials Information Technology Station (MITS)

Fatigue cracking is a phenomenon in which metals eventually fails under cyclical loads, even though they possess adequate strength against a simple tension or bending load. Just as ordinary people feel fatigue when they work too much, which sometimes tragically results in "death due to overwork," machines and structures also suffer fatigue when subjected to repeated stresses in use or operation, eventually resulting in failure. As one example, the jumbo jet crash against Osutakayama, Japan, in August 1985, was attributed to fatigue cracking which formed and propagated in a pressure bulkhead separating the passenger compartment from the outside.

The MITS Fatigue Group publishes data sheets on typical metal materials used in Japan in machinery and structures, including standard data on normal temperature fatigue, welded joint fatigue, and high-temperature fatigue, and has published 96 data sheets and 16 volumes of data sheet materials as data analysis materials since 1978. The object materials and contents of tests are studied and adopted based on the desires and needs of the times, as expressed in meetings on structural material data sheets, fatigue workshops, and similar forums.

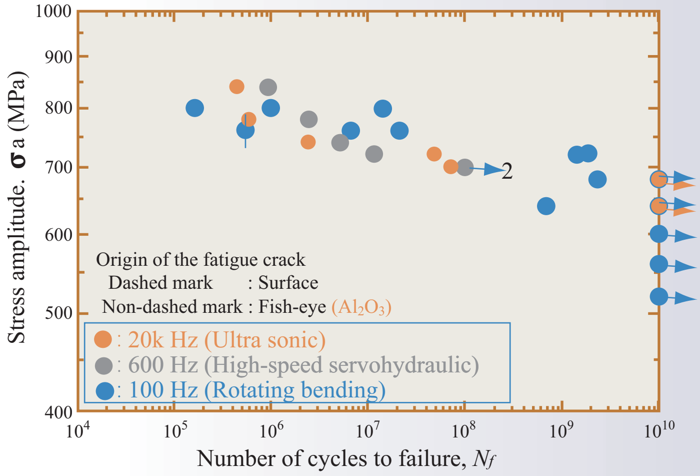


Fig. 1 Long-term normal temperature fatigue characteristics of SUP7.

Recently, it has become increasingly important to accumulate long-term fatigue data, reflecting the fact that extended use of equipment and structures is now normal. The Fatigue Group has accumulated data up to 10^{10} cycles for steels for machine and structural use, up to 10^8 cycles for welded joints of the materials, and 10^7 cycles for high-temperature materials under strain-controlled fatigue, and has published the results as data sheets in 10 volumes to date.

Fig. 1 shows the fatigue characteristics of high strength spring steel, SUP7, at room temperature. It takes an enormous amount of time to run the test up to 10^{10} cycle with conventional techniques., The Fatigue Group improved the existing test device to enable continuous long-term operation. In the figure, this is called the 100 Hz rotating-bending fatigue test machine. The blue circles indicate the test results up to 10^{10} cycles with this device, which required continuous operation for 3 years. Accelerated test methods were also studied with the aim of obtaining long-term fatigue results in a substantially shorter time. As test devices, the Fatigue Group quickly introduced a 600 Hz high-speed servo hydraulic tester and an ultrasonic fatigue tester, which operates at a frequency of 20 kHz, and established accelerated test methods for the fatigue test. The respective results are shown in the **Fig. 1** by the black and red circles.

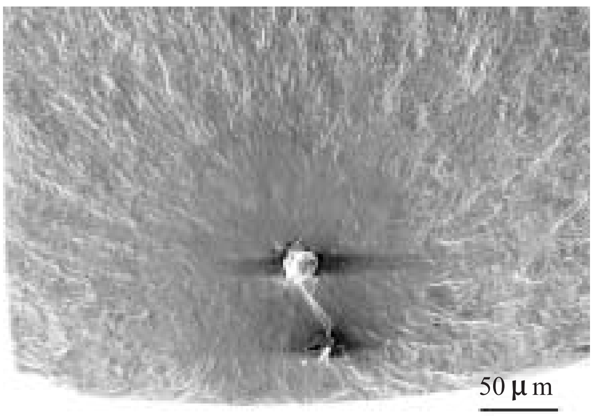


Fig. 2 Photograph of fracture called "fish-eye," which appears in long-term normal temperature fatigue test of SUP7 steel. (Object in center is a non-metallic inclusion which was the origin of the fracture crack.)

Under long-term fatigue of this type, the cyclical stress amplitude (ordinate in **Fig. 1**) is less than half of tensile strength, and the fatigue crack displays a typical fracture morphology called "fish-eye," as shown in **Fig. 2**. Under test conditions of this kind, where internal cracking occurs, with a non-metallic inclusion as the initiation point, the influence of frequency (from 100 Hz to 20 kHz) is substantially eliminated, as shown in the **Fig. 1**, demonstrating the effectiveness of the accelerated test up to 20 kHz. Using the 20 kHz tester, a 10^{10} cycle test can be completed in only just 1 week, which had required 3 years at 100 Hz.

For further information, please visit: http://www.nims.go.jp/mits/fatigue/index_e.html

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NIMS Signs General Agreements with Two Institutes in Chinese Academy of Sciences

The Chinese Academy of Sciences is an extremely large research group consisting of 108 laboratories and has 39,000 researchers engaged in research. Among its member organizations, IOP and IMR have achieved exciting results in the field of materials science, and high expectations are placed on both for the future. Thus, the two institutes are particularly well-suited partners for NIMS as it promotes comprehensive cooperation with the world's top class research institutes.

NIMS already has broad-ranging exchanges with its Chinese counterparts at the researcher level. Under the new agreements, NIMS opens a position for each institute in the ICYS (International Center for Young Scientists) Fellowship Program in order to promote further research/personnel exchanges, and IOP and IMR dispatch young scientists in the professor/assistant professor class. Two researchers from IOP and IMR have already been engaged in research at NIMS as ICYS Fellows.

Creep Data Sheets

—Contributing to high performance and improved reliability in high-temperature plants—

Kazuhiro Kimura
Creep Group
Materials Information Technology Station (MITS)

"Creep" is a phenomenon in which materials gradually deform over time when force is applied under high-temperature conditions (approx. 350 ℃ or higher for ferrous metals), ultimately resulting in fracture of the metal. Creep is a particularly important problem in power plants and other industrial facilities which are designed to operate at high temperatures for very long periods, sometimes extending over several decades. The Creep Data Sheet Project was begun in 1966 by a NIMS' predecessor, the National Research Institute for Metals (NRIM), with the aim of accumulating 100,000 hour creep test data for practical high-temperature metal materials. The creep test machines used in these tests are shown in **Fig. 1**.

Fig. 1 Creep testing machines (NIMS Meguro Site).

Thermal power plants fired with oil, coal, or natural gas currently account for approximately 55 % of total power generation in Japan. These plants also emit large quantities of CO_2, equivalent to about one-third of total Japanese emissions. One effective measure for reducing CO_2 emissions, which are considered to be the main cause of global warming, is improved energy efficiency in power generation, which is achieved by increasing the temperature/pressure of the steam used to drive generators, but this has resulted in increasingly severe high-temperature, high-pressure service environments for high-temperature materials. In response, considerable R&D has been done on heat-resisting materials with excellent high-temperature strength.

When materials are to be used under high temperatures, at which creep deformation and fracture may occur, an understanding of the creep characteristics of the material is essential for part and structure design. The allowable high-temperature tensile stress is generally determined based on the stress at which creep rupture occurs at 100,000 hours (approx. 11.4 years). Therefore, NIMS is systematically collecting 100,000 hour creep test data in the Creep Data Sheet Project, and had published 126 volumes as of the end of March 2004. NIMS is also systematically investigating structural changes in high-temperature metal materials in long-term use at high temperatures, and has prepared several collections of microstructure photographs. These resources are widely used as standard reference data for design and maintenance control of high-temperature structures, material development, establishment of standards, and related purposes.

As one particularly notable achievement, as of December 2003, NIMS had accumulated creep data for a continuous period of 300,000 hours (approx. 34.2 years) in a test of 0.3% carbon steel plates for boiler and pressure vessels which began in 1969. The results are illustrated in **Fig. 2**.

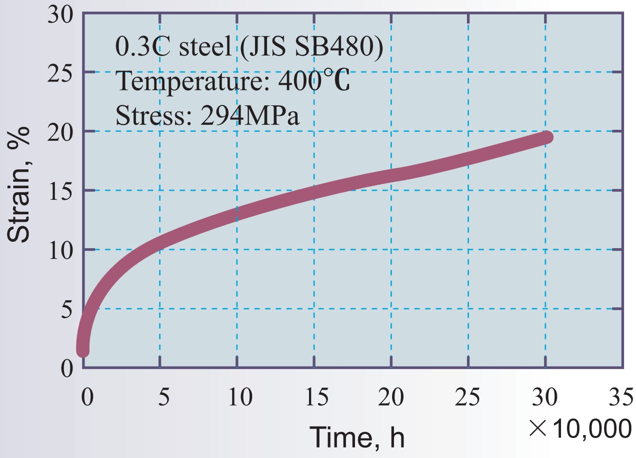

Fig. 2 300,000 hours creep curve for 0.3% carbon steel plate for boilers and pressure vessels.

When mechanical structures are to be used under severe high-temperature, high-pressure conditions, and particularly when high safety is also required, the design is based on a detailed analysis, including micro-region stress states and deformation behavior, as well as allowable tensile stress. However, virtually no long-term creep deformation data collected in a systematic manner has been available, either in Japan or in other countries. For this reason, NIMS creep data are used as basic data on material strength characteristics for the design of high-temperature equipment/structures and remaining life assessment of components in long-term use, making an important contribution to improving the safety and reliability of high-temperature plants.

For further information, please visit: http://www.nims.go.jp/creep/creep_e.html

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Structural Materials Data Sheets

Nevertheless, accidents continue to occur. Examples include the JAL jumbo jet crash in Japan in 1985, the collapse of highway and high-rise building in the Kobe Earthquake in 1995, and the failed launches of the H-II and M-V rockets in 1999. More recently, the shutdown of a boiling water nuclear reactor, the failed launch of the No. 6 H-IIA rocket, and fatal accidents in which trucks lost wheels have been topics in the mass media. The loss attributable to accidents, including major accidents such as these, has been calculated at 4 % of GNP (approx. 500 trillion yen). To improve this harsh reality even slightly, MITS has dedicated great efforts to preparing data sheets, and in June 2002, also acquired ISO 9001 certification as a measure to improve data sheet quality. In April of the present year, we began research aimed at further improving our data sheets, and will continue to accept new challenges in this field.

For further information, please visit: http://www.nims.go.jp/mits/

Space Use Materials Strength Data Sheets

—Improving reliability in leading-edge technologies in Japan—

Toshio Ogata
Cryogenic Materials Group
Materials Information Technology Station (MITS)

For a variety of reasons, including safety, domestic manufacture of rockets is a key technology for space exploration and development. However, possessing and fully utilizing the world's most advanced technologies is also essential for Japan as a technology-oriented country. Even more fundamental and important is the capability to obtain materials of the required quality and properties when necessary. At present, there are many fields where Japan's capabilities are not adequate and lag behind those of other nations. In particular, in cases where a country has introduced technology and is attempting to overtake the leaders through technical development, it may neglect to verify parts of the technology and material property data independently. This poses problems in use, and also makes it difficult to improve the existing technology and develop new technologies.

One example of this can be seen in the development of domestic rockets in Japan. The investigation of the failed launch of the No. 8 H-II rocket revealed that the property data on the material were inadequate. This led to the publication of the current series of Space Use Materials Data sheets by the NIMS Cryogenic Materials Group as a measure for improving rocket reliability.

One item which was pointed out during the investigation was the lack of data on the mechanical properties of the titanium alloy used in the liquid hydrogen fuel turbo pump (FTP), which suffered severe damage. In fact, the rocket's designers referred mainly to property data published by National Aeronautics and Space Administration (NASA) and National Research Institute for Metals (NRIM) for material of the same alloy composition, even though the forging ratio was different.

NIMS has potentials of properties evaluation and data for titanium alloys and other materials at cryogenic temperatures, and therefore was asked to prepare data on the mechanical properties of materials for use in domestic rockets as an urgent project. As shown by the results of past data sheets, publication of the obtained data in data sheet form has contributed to recognition of the materials by numerous people, and has also improved the reliability of the material itself. Based on this experience, when preparing data on the mechanical properties of future space-use materials, we began collecting data and preparing data sheets assuming wider publication, and not simple collection of data and use limited to rocket design.

As shown in **Fig. 2**, the publication of these data sheets is scheduled to begin with materials for the FTP and engine of the H-IIA rocket in order to ensure sound development and enhance the reliability of the H-IIA, which improved on the cost and performance of the H-II. This will be followed by materials as far as body parts, and will eventually include titanium alloys, Alloy 718, copper alloys for heterogeneous joint material, and superalloys. The series of tests are being carried out primarily by NIMS under a cooperative arrangement between NIMS and the Japan Aerospace Exploration Agency (JAXA), and the obtained data are being analyzed in detail and published in the form of data sheets, together with the photographs fracture surface.

These data have already been reflected in the design of machinery and operating conditions used in the H-IIA rocket, and contributed to successful launches up to No. 5. Because a fuller range of object materials will be included in the future, these results are expected to be used as data sheets on advanced materials for various kinds of fields.

Fig. 1 Launch of No. 4 H-IIA rocket (photo courtesy of JAXA).

Material	Publication Date
Ti-5Al-2.5Sn ELI Large billets	Feb. 2003
Alloy 718 EB-Welded joints, low-cycle fatigue	Feb. 2003
Ti-5Al-2.5Sn ELI Smaller billets	Mar. 2004
Alloy 718 EB-Welded joints, high-cycle fatigue	Mar. 2004
Alloy 718 Forged and cast materials	Mar. 2005
A286 Forged materials	Mar. 2006

Fig. 2 Publication schedule of data sheets.

For further information, please visit: http://www.nims.go.jp/cmg/e/index.html

Fabrication of Wavelength Conversion Device for High-Power Green Lasers

The Opto-Single Crystal Group, Advanced Materials Laboratory (AML) has successfully fabricated a wavelength conversion device by domain control in stiochiometric lithium tantalite crystals, and achieved a high power green light of 4.4 W in a single pass. The device will open the way to compact argon lasers leading to low-power consumption laser projectors. Although liquid crystal projectors are already used in homes and offices, the compact laser source will realize next-generation large-screen televisions because of lower heat loss in the new device.

Research for International Standardization

Toshio Ogata
Cryogenic Materials Group
Materials Information Technology Station (MITS)

In NIMS, research for international standardization is conducted in prestandardization projects aimed at developing the new evaluation methods necessary for application/practical use of new materials and promoting international standardization of those methods. In particular, the key tasks in research for international standardization are (1) promoting general knowledge and wide adoption of the new materials and new evaluation methods developed, (2) increasing Japan's level of contribution to international standardization activities, and (3) contributing to the Japanese public through ,coordinating standardization activities.

- Role of NIMS -

"Promotion of prestandardization projects" is included in the goals of the NIMS Mid-Term Plan under the heading "Improvement of intellectual infrastructure." To achieve this goal, NIMS is actively developing the new evaluation methods required for application and practical use of new materials and promoting international standardization of those methods. In these prestandardization projects, NIMS is endeavoring to fulfill its mission as the core organization in materials information in Japan, as a neutral public institution, with the aim of proposing reliable evaluation methods to the Versailles Project on Advanced Materials and Standards (VAMAS), the International Standards Organization (ISO), and the International Electrotechnical Commission (IEC). Furthermore, in order to strengthen Japan's international voice in matters related to international standards and persuasively advocate Japan's views in the future, NIMS believes that it is essential for Japan to create an "all-Japan" system, not limited to materials, and to improve the data which form the basis for the country's voice.

- VAMAS -

VAMAS was created as an international research cooperation project based on an agreement at the 1982 G7 Summit in Versailles. It is involved in activities to promote international standardization and encourage more active trade in advanced technologies and products through international cooperation on standards for advanced materials. Results obtained by VAMAS have been submitted to the ISO and IEC, where they have been recognized in international standards. Because a period of several years is required to publish an international standard, concrete results finally began to appear about 10 years after VAMAS began its activities. However, the project has now contributed to the establishment of approximately 60 standards in the ISO and American Society for Testing and Materials (ASTM). In recent years, VAMAS has earned an increasingly high international reputation and strengthened its cooperative relationship with the ISO, thereby expediting ISO standardization based on VAMAS results, for example, by forming a liaison of mutual respect for the achievements of the two organizations. As shown in **Fig. 1**, the discussion period until standardization in the ISO has been shortened by reporting and evaluating the results of international round-robin tests in VAMAS (in this kind of test, samples are distributed to each participating institution, and tests are performed to compare test results) and submitting VAMAS Technical Transfer Assessments (TTA) documents to the ISO.

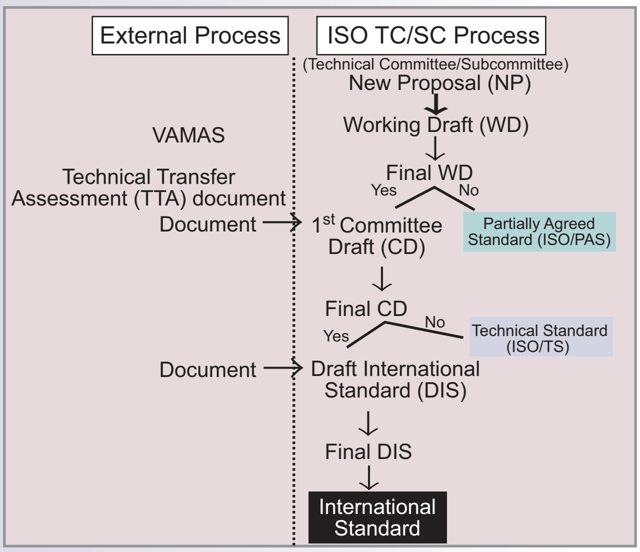

Fig. 1 ISO standardization process and liaison with VAMAS.

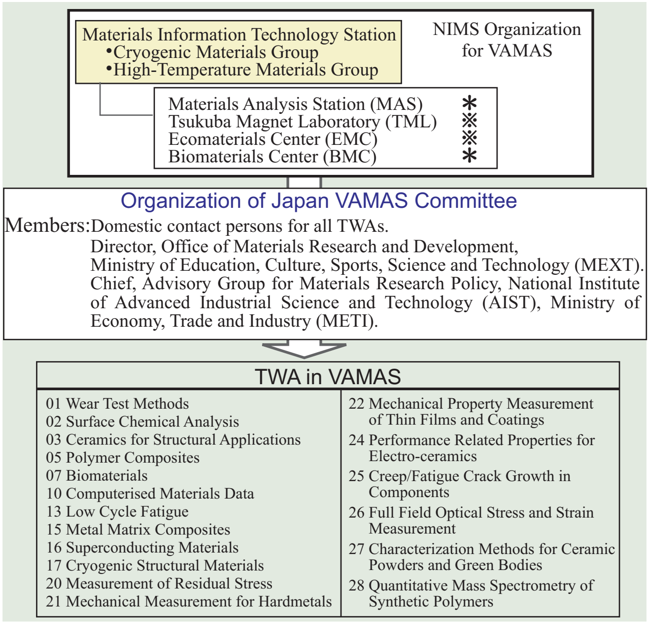

Fig. 2 International standardization promotion system in NIMS and VAMAS TWA.

As shown in **Fig. 2**, VAMAS has 18 Technical Working Areas (TWA), including Surface Chemical Analysis, Ceramics for Structural Applications, Polymer Composites, Biomaterials, Computerised Materials Data, Metal Matrix Composites, Superconducting Materials, Cryogenic Structural Materials, Mechanical Property Measurement of Thin Films and Coatings, and Creep/Fatigue Crack Growth. Key persons are designated to summarize the results achieved in Japan in each TWA. Where NIMS is concerned, in view of the global potential of the NIMS Centers and Stations, and particularly the MITS, NIMS personnel currently serve as International Chairmen for 4 TWAs. NIMS has also organized a Japan VAMAS Domestic Committee, with a membership which includes members of the VAMAS Steering Committee, persons concerned with international standards, and the Japanese key persons. The Committee is responsible for reporting and evaluating the results of research for standardization in Japan, studying Japan's contribution to international joint research under VAMAS, and proposing new TWA. This cooperative system and the research results achieved through positive activities for standardization of new materials and related evaluation methods in collaboration with VAMAS are helping to strengthen Japan's voice in the ISO/IEC, facilitating Japanese-led proposals on standards. This is because adequate supporting research data and cultivation of international cooperative relationships are necessary when proposing international standards, and it is difficult to win approval for standards under discussion if proposals are submitted to the standards committee without adequate preparation.

< Continued on p.7

Corrosion Data Sheets

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Corrosion Group
Materials Information Technology Station (MITS)

Corrosion is the general name given to a diverse range of chemical phenomena caused by reactions between materials and the environment in which they are placed. Moreover, depending on the environment, corrosion phenomena (chemical reactions contributing to corrosion, corrosion mode, corrosion rate, etc.) differ widely, even with the same material. For example, corrosion of carbon steel varies greatly in seawater and air, and even in the same seawater environment, corrosion is extremely fast in the tidal zone (zone where the water level changes due to tidal movements) in comparison with a submerged depth of only 2-3 meters.

Among these diverse corrosion phenomena, the Corrosion Group is presently preparing data sheets on atmospheric corrosion phenomena in low-alloy steels. An extremely important factor affecting the corrosion rate in atmospheric corrosion is the concentration of airborne salt particles. When considering corrosion in mountainous, rural, and coastal areas, experience suggests that corrosion is most severe in coastal areas (see **Figs. 1 and 2**). However, in recent years, the use of rock salt to clear snow and prevent highways from freezing has resulted in corrosion problems affecting the underbody of automobiles and steel bridges in mountainous and cold districts, where corrosion was rarely considered a problem in the past.

In order to accumulate basic data and establish development guidelines for corrosion-resistant low-alloy steels in coastal environments, the Corrosion Group began atmospheric exposure tests in 1998, centering on Fe-Ni and Fe-Cr binary alloys. These tests have now been in progress for 5 1/2 years. At the 3-year point, data were collected and published in Corrosion Data Sheet No. 1A (2002). We are now preparing to publish materials incorporating information on the effect of alloying elements on atmospheric corrosion resistance and photos of test pieces, which could not be included in the original No. 1A (scheduled publication date: March 2005).

After publishing No. 1A, we were contacted by a number of persons who asked that we publish corrosion data sheets for other materials and environments. We are currently evaluating the corrosion resistance of a variety of materials in atmospheric corrosion environments and plan to expand our basic data on atmospheric corrosion. We are also studying users' requests with a forward-looking attitude and will reflect these needs in future research on corrosion data sheets with the aim of creating new data sheets which serve a wide range of users.

Fig. 1 Appearance of Fe-1%Al alloy exposed for 2 years at Miyakojima (broken line shows original shape of test piece).

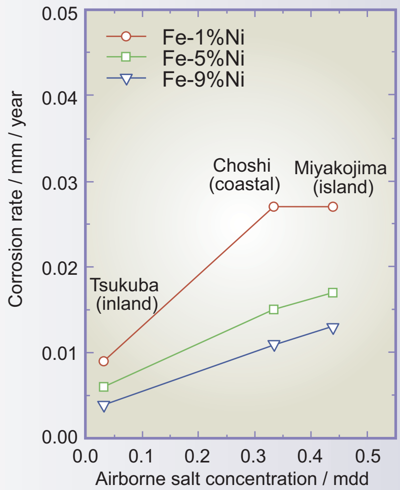

Fig. 2 Effect of airborne salt concentration on corrosion rate.

For further information, please visit: http://www.nims.go.jp/corrosion/index_e.html

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The Steering Committee of VAMAS consists of the Directors of leading materials research institutes and government officials responsible for science and technology policy in each G7 country and the EU. The participating member from NIMS is Dr. Koichi Yagi, Director General of the MITS. The Steering Committee meeting was held in Japan in 2002, with NIMS as the host institution, and was held by the Joint Research Center (JRC) in the Netherlands in 2003. As part of the VAMAS activity strategy, the Committee discussed cooperation and information exchanges with other international standardization organizations. It also considered reorganization of the biomaterials TWA and proposals for new TWAs in ecomaterials and nanomaterials, as fields in which all countries have shown a strong interest as future areas for standardization of new materials, and held positive discussions based on Japan's potential.

- Achievements of VAMAS Activities in Japan -

The most important achievements of VAMAS activities in Japan have been (1) maintenance of the system/network for materializing international standards from proposals, rather than the sheer number of international standards established, and (2) organization of the Japan VAMAS Committee and creation of a foothold for Japan in international standardization activities, thereby maintaining a bridgehead to international society until strategies can be worked out and fully demonstrate their effectiveness.

- Challenges for International Standardization Activities -

As one challenge for international standardization activities, the process from the proposal to materialization of an international standard normally requires about 5 years, and it is therefore necessary to respond to this with a sense of international responsibility. However, in the past several years, the number of private-company laboratories has decreased, reducing the data which form the basis for discussion, while the number of human resources has also continued to shrink. This is because it is difficult to earn a high evaluation for activities from surrounding persons and institutions, and the capabilities of individual as such are weak. Nevertheless, just as an investment in education is more valuable than wealth, securing future markets and the possibility of activity in international society are clearly more important than immediate profits. At present, leadership from public institutions is strongly demanded in many fields of standards. If NIMS took a major part in centralizing the concerted cooperation of those engaged in international standardization activities and persons who understand the importance of these efforts, we can strengthen Japan's voice, including in international society. This will benefit the nation as a whole, and will also contribute to the Japanese people and our descendents.

For further information, please visit: http://www.nims.go.jp/cmg/e/index.html

■ Do you have the Point Card? ■

"Can you speak Japanese?"

With an anxious look, my friends asked me when I decided to come here as a postdoctoral fellow after my thesis in Montpellier. My answer was 'No'. However, I was not worried about it, and even looking forward to my new cheerful adventure, as I've already known, through my experience in France, how full my heart would be when I can make friends in a foreign language about which I've known nothing at all before. It was wonderful for me as if an ignorant student became a potential UN diplomat. Research in a foreign country, it is really good chance to learn a different language even if I'm not obliged, not only for the language itself, but also for many other things such as culture and human relation.

[With friends, right]

Jihye GWAK (South Korea)
JSPS Fellow (Nov. 2003-Nov. 2005)
Eco-Energy Materials Group
Ecomaterials Center

It's already seven months that I've been here. Although it seemed much easier than French language for the Korean people like me, I could not make enough progress in Japanese against my initial expectation to be fluent in a couple of month. How ambitious I was!

Anyway, I'm cheering up myself as looking at my many Point Cards of supermarket, drugstore, photo shop, and Karaoke, etc, which I couldn't get before knowing these sentences in Japanese, 'Do you have the point card?', 'May I get it now? Is it free?' Points on the cards are directly related with cash. Do you see now that the language is not only for the language itself? For my Japanese today, I'm going to watch an animation DVD 'Totoro', purchased for half-price thanks to the Point Card, after drinking a free beer, of course, thanks to another Point Card.

[With colleague, front center]

Michal Hájek (Charles University, Czech Republic)
Joint International Graduate School Program
(Oct. 2003-Sep. 2004)
Particle Simulation and Thermodynamics Group
Computational Materials Science Centre

My name is Michal Hájek. I am a Ph.D student from Czech republic,currently a member of Particle Simulation and Thermodynamics Group at the Computational Materials Science Centre under the kind leadership of prof. Hidehiro Onodera. For me, life in Japan is completely new and ultimately exciting experience. Besides the possibility to visit many different top rating scientific facilities (e.g. Spring-8 synchrotron - to name one for all), which I employed with pleasure, I am also concerned about the life and habits of ordinary Japanese people.

In this respect I am thankful to all my Japanese coworkers and friends for their warm and human attitude, which enabled me to discover that even though many things in Japan are completely different from what I knew in Europe, there is also a surprising number of similarities. Many daily rituals and the same social behaviour take place at the same situation although they might differ in form. For example bowing can be compared to shaking hands since bowing properly seems to be difficult for foreigners the same way shaking hands well is not automatic for Japanese. Yet through both of them good will can be expressed.

All my wishes are not only to maintain but rather to further develop many professional as well as personal relationships which I have established.

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