Workshop（懇談会) for research and education on structural materials in aerospace technology

February 12 Friday 14:30 ~ 17:00
@Hotel DECA College room
No registration fee
Support : Consulate-General of Japan in *Seattle*

Aerospace technology innovation fundamentally depends on materials research of the types actively performed at the National Institute for Materials Science (NIMS) in Japan. It also increasingly depends on effective strategies of international exchange. Recently, NIMS has significantly increased its overseas activity in Seattle, Washington by establishing the NIMS Overseas Operation Office in April 2008.

NIMS delegates, the heads of key divisions, including the President of NIMS, Prof. Ushioda, will visit Seattle to explore possibilities between NIMS and UW on collaborative research related with aerospace materials.

Despite the fact that structural material research on aerospace technology is key to heavy industry and related to social sustainability and security, it is difficult to perform such research in academia and even in national research institutes.

In this workshop in the form of a panel discussion, we will discuss about the state-of–the art on structural material research and education in NIMS, UW and industries (mainly Japanese companies and Boeing Company) and explore the ties among them to strengthen research and education, especially in the Pacific Northwest.

Your participation and proposal will be genuinely welcome. Please contact to the organizer of this workshop, Kenji Kitamura, NIMS Overseas Operation Office email: kk28@uw.edu

独立行政法人　物質・材料研究機構（旧科技庁金属材料技術研究所＋無機材質研究所）は、研究・技術開発の国際的な連携を目的とし、2008年4月に海外業務拠点の一つをシアトルに開設しました。この度は、機構の潮田理事長をはじめ、航空工学に関連した構造材料研究分野の専門家がワシントン大学との交流を深めるため、シアトルを訪問する機会を得ました。
ナノとかバイオの研究が注目される昨今、国家戦略において、もっとも重要な構造材料研究がないがしろにされる傾向にあり、これは大変な損失です。これらの研究に対して、企業からのニーズは依然強いのですが、大学から供給できないのが現実で、学生に材料の王道であるstructural materialsを十分教えられない状態になりつつあります。 UWでもstructural materialを専攻する研究室が限られ、Boeing社やそれに関わる企業が多く存在するシアトルの地で、structural material の研究がacademiaでは衰退しつつあります。もちろん、日本の大学においても同様のことが言えそうですが、こちらでも多くの教授が憂慮していることがわかりました。そこで、NIMS-UW-日系材料関連企業（＋Boeing社)で、この分野における今後の研究および教育に関する懇談会の開催を計画しております。
ワークショップ（懇談会）は、パネルディスカッション形式にし、NIMSにおける構造材料研究 の実情、NIMS-UWとの連携経緯と発展、UWにおける教育・研究の実情、日系関連企業からの要望・意見などを出し合い、本分野における研究開発・教育の強化を論議する場となることを希望しております。 皆様のご参加を心から歓迎いたします。 また、コメントを頂ける方を募集いたします。

問い合わせ先：北村健二　NIMS Overseas Operation Office　email: kk28@uw.edu
＊ご参加をご希望される場合には、2月8日までにご連絡いただけますようお願いいたします。
UW側 のコメンテーターおよび企業からご参加頂ける方が分かりましたところで、Program を再編成し参加予定者に改めて御連絡いたします。

Introduction of Delegates from NIMS

Prof. Sukekatsu Ushioda
President of NIMS

Name	Sukekatsu USHIODA
Education	1964 A. B. (Physics) of Dartmouth College 1965 M. A. (Physics) of the University of Pennsylvania 1969 Ph.D of the University of Pennsylvania
Specialty	Physics, Surface Properties
Professional Career	1969 Assistant Professor in the Department of Physics, University of California, Irvine 1974 Associate Professor at the same university 1978 Professor at the same university 1985 Professor, Research Institute of Electrical Communication, Tohoku University (Joint Appointment) 2004 President, Japan Advanced Institute of Science and Technology 2008 Fellow, National Institute for Materials Science (NIMS) 2009 President, National Institute for Materials Science

Dr. Yoshio Aoki
General Manager of Collaboration-Promotion Office

Name	Yoshio AOKI
	1976 : Ph. D., Northwestern University, Evanston, Illinois –Polymer Physics
Career in NIMS	2009 ~ Present : NIMS General Manager of Collaboration-Promotion Office : Responsible for intellectual properties and research collaboration with strategic partners. 2008~ 2009 : NIMS Senior Staff , Collaboration-Promotion Office : Responsible for research collaboration with strategic industrial partners.

http://www.nims.go.jp

Introduction of NIMS Experts

Hybrid Materials Center

Managing Director Seiji KURODA

The Hybrid Materials Center is engaged in the development of hybrid materials and coatings based on new concepts.
The Center's objective is to create failsafe hybrid materials that will contribute to improved safety in plants, transportation equipment, etc…. by developing composites and hybrids of heterogeneous materials at the nano-scale and micro-scale.

This project aims to develop a new class of structural materials called the Fail-Safe Hybrid Materials, which can tolerate large deformation before failure and avoid unexpected structural collapse. We will develop model materials to verify the concept by adopting the nanocomposite and multi-scale hybrid effects. In the latter stage of the project, this approach will be applied to lightweight materials such as FRP and environmental barrier ceramic coatings, resulting in improved safety and reliability of various structures, energy generation plants, and transportation equipment.

http://www.nims.go.jp/eng/units/p06_hybrid.html

Dr. Kuroda has been elected to the College of Fellows of ASM International

Lightweight Alloys Group

Group Leader Toshiji MUKAI

Weight reduction has a significant role to play in the reduction of greenhouse gases. In case of the structural applications, strength of lightweight alloys should be increased together with ductility and toughness to improve relatively low stiffness and/or to increase e reliability.

We are engaged in research to optimize the microstructure in order to realize high strength and high toughness in lightweight alloys without sacrificing high ductility by improving the microstructure of the material at the micro as well as nanoscale; *e.g.* combination of grain refinement and texture randomization enhance the ductility and fracture toughness in high-strength Mg alloys, and those are comparable to conventional high-strength Al alloys. http://www.nims.go.jp/eng/units/p05_structural-metal.html

Materials Reliability Center

Managing Director Toshio OGATA

At the Materials Reliability Center, we are working to elucidate failure mechanism through development of life assessment methods for creep, fatigue and stress corrosion cracking in practical environments. A construct (by focusing on strength reduction due to high-cycle fatigue and long-term creep) the technological foundation for life assessment as well as for accident analysis of materials. We also seek to establish assessment technology for strength/properties of structural materials that undergo degradation and sustain damages..

At our center, we focused on the strength reduction resulting from long-term creep (due to extended running periods, beyond the thirty-thousand-hour mark) along with high-cycle fatigue (at operational rates over 10 to the ninth order level); then, we constructed a database from experimental results and adopted non-destructive assessment methods in order to build up the technological foundation for materials life assessment and accident analysis. We are in tandem working to apply – for elucidation of the failure mechanism and conduct of accident analysis – "to-be-established" technology, which utilizes nanotechnology such as nano-indentation for assessment, as to assessment of the nano-microstructure conditions (in terms of strength and properties) within structural materials undergoing degradation and being damaged.

http://www.nims.go.jp/mrc/index_e.htm

Composite Materials Group

Senior Researcher Kimiyoshi NAITO

Fiber reinforced polymer-based composites have become a dominant material in the aerospace, automotive and sporting goods industries. Some of these composites are useful, however, only in highly specialized situations where limitations such as brittle fracture behavior are considered. By mixing two or more types of fiber in a common matrix to form a hybrid composite it may be possible to create a material possessing the combined advantages of the individual composite.

Dr. Naito is engaged in research to develop the multi-scale hybrid in order to realize the structural safety (failsafe function) and high interlamina shear strength in carbon fiber reinforced polymer-based composites without sacrificing high specific modulus/strength. Previously he worked in a Mitsubishi Electric Corporation to fabricate the satellite structures.

http://www.nims.go.jp/eng/units/p06_hybrid.html

Over view of NIMS Activity and Open Facilities

ISI Institutional Citation Ranking
Materials Science

Jan. 2005 – Feb. 2009		
Rank	**Institution**	**Citation**
1	Chinese Acad. Sci.	32,241
2	Max Planck Society	14,607
3	NIMS	10,003
4	Tohoku Univ.	9,845
5	Natl. Univ. Singapore	9,460
6	Tsing Hua Univ.	8,840
7	MIT	8,271
8	AIST	7,465
9	CNRS	7,049
10	CSIC	6,884

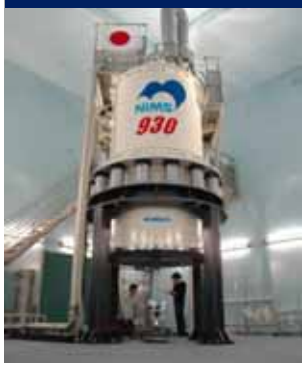
Compiled from the ESI database
by Information Sciences Institute

NIMS Open Facilities

Hybrid Magnet

High-voltage electron microscope

930MHz NMR



Nanotechnology Innovation Center

Synchrotron Radiation

NIMS Overseas Operation Office @University of Washington, Seattle

Dr. Kenji Kitamura
Director of NIMS O^3
NIMS Fellow, MANA/NIMS PI

In fall 2007, NIMS was selected as one of a handful of institutions receiving a ten-year research mega-grant from the MEXT Japan, establishing the "*International Center for MAterials NanoArchitectonics (MANA)*" with the goal of contributing to solutions for pressing societal problems faced in the 21st century, such as biomedical, environmental, energy and resources issues.

As one of international activities in MANA, NIMS opened its Overseas Operation Office (O^3) on the UW campus to establishing UW as an international crossroad for materials research and development.

Among several missions of NIMS O^3, exploring possibilities of collaborations with US companies, especially in the Pacific Northwest, should be also promoted through the office.

Professor F. S. Ohuchi
Department of Materials Science and Engineering
University of Washington
Seattle, WA

Director : NIMS Overseas Operation Office

A MSE-Professional Maser Certificate/Degree Program on Structural Materials

The engineering filed is constantly changing, and keeping up with change is a big challenge for engineers. Materials Science and Engineering programs have rapidly changed over the past years to cover a broader range of materials to meet the challenges of today's and tomorrow's technologies. While this change has resulted in a tremendous growth of our programs, it has also resulted in a shortage in supplying an adequate workforce to more traditional metallurgy and ceramic fields. In particular, the number of people studying metallurgy has decreased rapidly. As this trend, combined with an aging workforce in industry, continues, it becomes a serious threat in advancing the structural material field in the future. For example, it has become evident at Boeing that many engineers working in the field of structural materials are retiring within next 5 years, yet hiring new graduates remains a concern. When the new aerospace engineering is further advanced, there will be an increasing need for people with adequate knowledge of metallurgical engineering. We anticipate such demands growing rapidly in next five years.

Understanding the demand-supply relationship in this field, UW's MSE department is currently preparing a "MSE-Professional Maser Certificate/Degree Program on Structural Materials". This program is aimed at re-educating our graduates and/or professionals who are already working in industries, are seeking to upgrade their existing skills in the current economy, and/or are interested in learning structural materials in their careers.

In this workshop, I will introduce our plan of this program, and discuss how the proposed program can help vitalizing the area of structural materials and meeting the future demands.

Directions to Hotel DECA

54507 Brooklyn Ave NE, Seattle, WA 98105

From Seattle downtown

Take **I-5 N** toward **VANCOUVER BC**

Take exit #169/NE 45TH ST/NE 50TH ST onto **7TH AVE NE** toward **N.E. 45TH ST./UNIV. OF WASH.** - go **0.5** mi