

[http://www.jst.go.jp/sip/dl/k03/jst\\_pamphlet\\_english.pdf](http://www.jst.go.jp/sip/dl/k03/jst_pamphlet_english.pdf)

# SIP-IMASM 2015

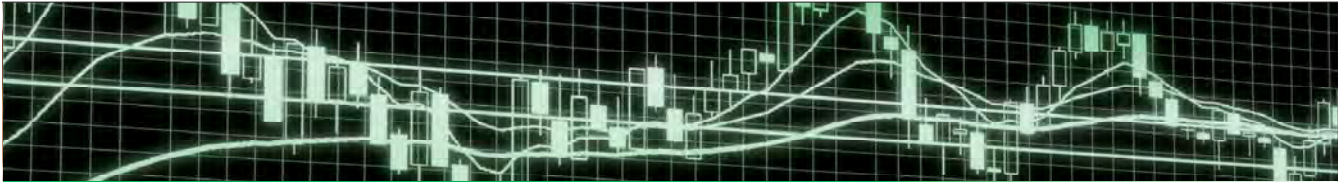
September 29<sup>th</sup> – October 1<sup>st</sup>, Tsukuba, Japan

The 1st Symposium of Strategic Innovation Promotion Program – Innovative Measurement and Analysis for Structural Materials (SIP-IMASM) will take place from September 29 to October 1, 2015 at the AIST lecture hall, Tsukuba, Japan. It will consist of a two day workshop and a one day lab tour. The SIP-IMASM is the R&D consortium consisting of the National Institute of Advanced Industrial Science and Technology (AIST), the National Institute for Materials Science (NIMS), Tsukuba University, and the High Energy Accelerator Research Organization (KEK) and focuses on investigations of structural materials relating to aircraft and power plants. The SIP-IMASM team in a field of materials integration under the program of Structural Materials for Innovation whose program director is professor Teruo Kishi and is working to develop unconventional measurement instruments and measurement protocols to acquire information that is inherent in structural materials and essential for the improvement of mechanical performance and the prediction of the lifetimes.

Our R&D resources include synchrotron radiation, ion beam analysis with superconducting X-ray analysis, nano-characterization such as the 3D atom probe, and positron annihilation. In this symposium, we will invite authorities in related fields and present our latest R&D results to promote cooperation with researchers over an extensive range of measurement and analysis as well as the above-mentioned analytical techniques.

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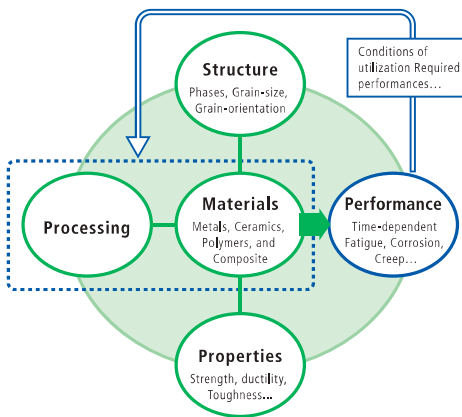




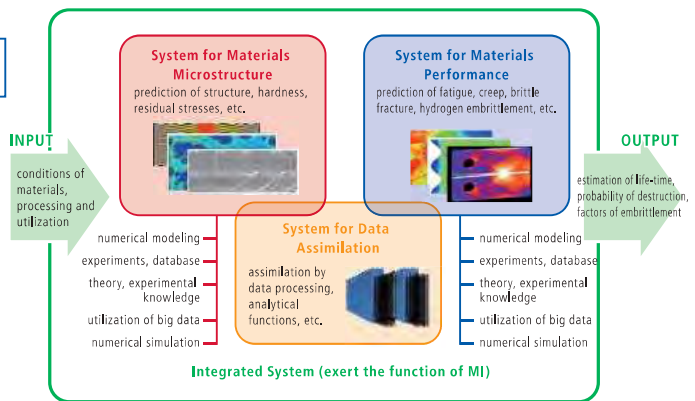
# Materials Integration (MI)

Main subjects of Materials Integration System are i) to predict the performance (life-time) of elements/structure which are manufactured from various choices of materials and processes, ii) to integrate theories, experimental knowledge, computation, measurement, database etc., and to utilize big-data, iii) contributing to reduce development time, to realize efficient development, to reduce manufacturing cost, to optimize the selection of materials and processes, to improve the reliability prediction and to reduce diagnosis and maintenance cost, and also iv) aiming to establish R&D center, capacity building and global network.

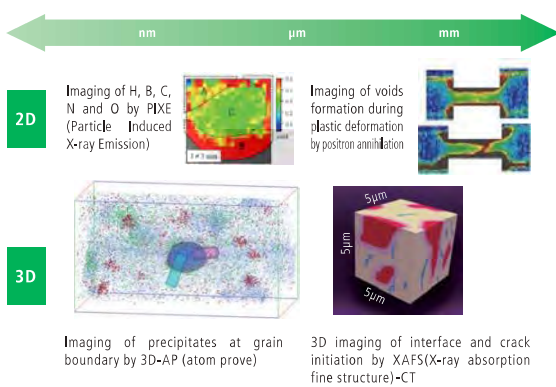
## MI: Integration of theories, experiments, computation and data



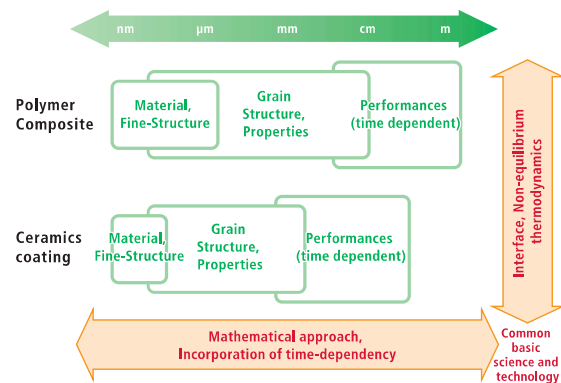
## MI for Metals (weld joint of HSS is implemented in advance as a typical challenge)



## Prediction of life-times or performances by innovative measurement and analysis for structural materials (SIP-IMASM)



## MI for Various Structural Materials



	No.	Research Project	Research Unit	Unit Leader
Project at research center	D61	Development of Materials Integration System	Development of System for Materials Microstructure	◎ Toshihiko Koseki (Univ. Tokyo)
	D62		Development of System for Materials Performance	Manabu Enoki (Univ. Tokyo)
	D63		Development of System for Data Assimilation	Junya Inoue (Univ. Tokyo)
	D64		Development of Integrated System	Yasuo Koide (NIMS)
Project at research center	D65	Development of Simulation Technique for Performance Assurance of Weld Joints	○ Akio Hirose (Osaka Univ.)	
Project at research center	D66	Innovative Measurement and Analysis for Structural Materials (IMASM)	○ Masataka Ohkubo (AIST)	
Project at research center	D67	Fundamental Research Focusing on Interface for Overcoming Unsolved Issues in Structural Materials	○ Kaneaki Tsuzaki (Kyushu Univ.)	
Unit Project	D68	Development of Simulation for Mass Transfer at High Temperature and Time Dependent Behavior of Microstructure		Hideaki Matsubara (Tohoku Univ.)
	D69	Development of Computational Tools to Predict Time Dependent Phenomena in Structural Materials		Tetsuo Mohri (Tohoku Univ.)
	D70	Development of Prediction Tools for Long-term Properties of High Performance Engineering Plastics		Takashi Kuriyama (Yamagata Univ.)
	D71	Development of Practical Optimal Design and Comprehensive Evaluation Support Tool for Advanced Structural Polymer Materials		Shin-etsu Fujimoto (Nippon Steel Chemical Co., Ltd.)
	D72	Mathematical Approach Toward Materials Integration and its Applications		Yasumasa Nishiura (Tohoku Univ.)
	D73	Establishment of Domestic Technology base for Computational Thermodynamics for Development of Advanced Structural Materials		Kazuhsa Shobu (AIST)

Director of research domain : Toshihiko.Koseki (Univ. Tokyo) ◎ : Director of research domain ○ : Manager of Research Center

## D66: Innovative Measurement and Analysis for Structural Materials (SIP-IMASM)

Extracted from the pamphlet of JST SIP-Structural Materials for Innovation

# 1st Symposium on Innovative Measurement and Analysis for Structural Materials (SIP-IMASM2015)

Sep.29-30 (Symposium), Oct.1(Lab Tour)  
National Institute of Advanced Industrial Science and Technology(AIST)  
Tsukuba Central 1 Auditorium  
<https://unit.aist.go.jp/neri/ja/event/sip-imasm2015.html>



【9/29(Tue.)】

09:00 Registration

「Session chair: Fons Paul (AIST)」

09:50 Guest speech Eizo Matsumoto (CAO)

Introduction Masataka Ohkubo "Introduction to SIP-IMASM"

「Session chair: Masataka Ohkubo (AIST)」

10:20 Keynote Teruo Kishi (CAO) "Structural Materials for Innovation"

10:50 Coffee Break

11:00 Invited J. D. Almer (ANL) "XRD Analysis of Structure Material at APS"

11:50 Symposium Photo, Lunch

「Session chair: Eiji Kita (U.Tsukuba)」

13:20 Invited Satoshi Kitaoka (JFCC) "Development of Ceramic Environmental Barrier Coatings for Advanced Airplane Engine Applications"

13:50 Invited Masao Kimura (KEK) "In situ Observation using Synchrotron Radiation of Various Reactions in Steel Processes"

14:20 Thema-1 Masao Kimura (KEK) "Overview of theme 1: Imaging of Strain, Cracks and Chemical States for Structural Materials"

14:40 Thema-1 Yoshihisa Tanaka (NIMS) "In-situ Multi-scale Strain Imaging for Composite Materials using FE-SEM during Mechanical and Thermal Loading"

15:00 Thema-1 Yasuo Takeichi (KEK) "Application of XAFS & XRD Mapping Techniques for Various Materials"

15:20 Coffee Break

15:40 Keynote Yutaka Kagawa (U. Tokyo) "Concept Of "Materials Integration" And Some Examples"

16:20 Posters

18:00 Banquet

【9/30(Wed.)】

「Session chair: Hideaki Kitazawa(NIMS)」

09:00 Invited M. Ionescu (ANSTO) "Ion Beam Analysis for Materials Science"

09:50 Invited Katsuyuki Fukutani (U.Tokyo) "Analysis of hydrogen in materials with the  $^{15}\text{N}$  nuclear reaction combined with thermal desorption spectroscopy"

10:20 Coffee Break

10:30 Invited Nobuo Takeda (U.Tokyo) "Life Cycle Monitoring and Quality Assessment of Advanced Polymer Matrix Composites"

- 11:00 Thema-2 Eiji Kita (U.Tsukuba) "Overview of theme 2: Quantitative Elemental Analyses of Hydrogen and Light Elements in Structural Materials"
- 11:20 Thema-2 Daiichiro Sekiba (U.Tsukuba) "IBA for Hydrogen Uptake Observation in Functional Metals under Ambient Condition"
- 11:40 Thema-2 Fons Paul (AIST) "XAFS Structural and Chemical Analysis Approach for the Trace Light Elements of B and N in Heat-Resistant Steel"

12:00 Lunch

「Session chair: Nagayasu Oshima (AIST)」

- 13:20 Invited Masato Ohnuma (Hokkaido U.) "Nanoscale Characterization in Structural Materials by SAXS and SANS"
- 13:50 Invited Tomonori Kitashima (NIMS) "Development of High Temperature Titanium Alloys, Microstructure and Property Prediction Methods"
- 14:20 Theme-3 Hideaki Kitazawa(NIMS) " Overview of theme 3: Development of Multiscale Characterization in Structural Materials"
- 14:40 Theme-3 Kazuhiro Hono (NIMS) " Microstructure Characterization of Structural Materials using Laser Assisted 3D Atom Probe"
- 15:00 Theme-3 Daisuke Fujita (NIMS) "Nanoscale Characterization of Structural Composite Materials"

15:20 Coffee Break

「Session chair: Masao Kimura (KEK)」

- 15:40 Invited Yasuharu Shirai (Kyoto U.) "Positron Annihilation Study of Vacancy-Type Defects in Iron and Steels"
- 16:10 Invited Manabu Enoki (U.Tokyo) "Development of Performance Prediction System"
- 16:40 Theme-4 Nagayasu Oshima (AIST) "Overview of theme 4: Positron Annihilation Spectroscopy Based Research for the SIP-IMASM project"
- 17:00 Theme-4 Akira Uedono (U.Tsukuba) "Vacancy-Type Defects and Open Spaces in Solid-State Materials Probed by Means of Positron Annihilation"
- 17:20 Theme-4 Ken Wada (KEK) "Performance Test of a Pulse Stretch System for Material Sciences at KEK Slow Positron Facility"

17:40 Closing

【10/1(Thu.)】

Lab Tour (AIST, NIMS, University of Tsukuba, KEK)

Poster presentation (9/29(Tue.))

- 1-1 Masao Kimura (KEK) "Observation of Heterogeneous Reactions using XAFS, XRD and CT with SR"
- 1-2 Yoshihisa Tanaka (NIMS)"In-situ Multi-scale Strain Imaging for Composite Materials using FE-SEM during Mechanical and Thermal Loading"
- 1-3 Yasuo Takeichi (KEK) "Application of XAFS & XRD Mapping Techniques for Various Materials"
- 1-4 Keiichi Hirano (KEK) " Development of X-ray Multiple Image Radiography at the Photon Factory "
- 1-5 Yasuhiro Niwa (KEK) "Development of Nanosecond Time-Resolved Dispersive XAFS System for Irreversible Phenomena"
- 1-6 Yumiko Takahashi (KEK)"CT imaging of Structure Materials"

- 1-7 Qinghua Wang (AIST) "Full-Field Deformation Measurement of Carbon Fiber Reinforced Plastics under Three-Point Bending Test at Micro Scale"
- 1-8 Makoto Watanabe (NIMS) "Laser ultrasonic testing of carbon-fiber-reinforced plastic (CFRP) with Mid IR pulsed light source generated by OPO"
- 2-1 Eiji Kita (U.Tsukuba) "Overview of theme 2: Quantitative Elemental Analyses of Hydrogen and Light Elements in Structural Materials"
- 2-2 Daiichiro Sekiba (U.Tsukuba) "IBA for Hydrogen Uptake Observation in Functional Metals under Ambient Condition"
- 2-3 Fons Paul (AIST) "AFS Structural and Chemical Analysis Approach for the Trace Light Elements of B and N in Heat-Resistant Steel"
- 2-4 Shigetomo Shiki (AIST) "Superconducting X-ray Spectrometer for Trace Light Elements in Structural Materials"
- 2-5 Go Fujii (AIST) "Superconducting Energy-Dispersive X-ray Detector for Multi-Element Analysis of Trace Light Elements"
- 2-6 Byeonchan Suh (NIMS) "Nanostructure Analysis of Heat Resistant Steel"
- 2-7 Taisuke Sasaki (NIMS) "3DAP/TEM study on Boron Partitioning Behavior in 9Cr-3Co-3W Heat-Resistant Steel"
- 2-8 Kimikazu Sasa (U.Tsukuba) "6 MV Tandem Accelerator System for Ion Beam Analysis of Structural Materials at the University of Tsukuba"
- 2-9 Akiyoshi Yamazaki (U.Tsukuba) "Development of the High Resolution Ion Microbeam System for Analysis of Structural Materials and the Present Results of PIXE Test Measurements at the University of Tsukuba"
- 2-10 Kenichi Kimijima (KEK) "In situ Observation of Reduction Kinetics of Iron Oxides"
- 2-11 Norimichi Watanabe (NIMS) "Characterization of Microelement in Ferritic Heat-Resistant Steels by TOF-SIMS"
- 3-1 Hideaki Kitazawa (NIMS) "Overview of theme 3: Development of Multiscale Characterization in Structural Materials"
- 3-2 Kazuhiro Hono (NIMS) "Microstructure Characterization of Structural Materials using Laser Assisted 3D Atom Probe"
- 3-3 Daisuke Fujita (NIMS) "Nanoscale Characterization of Structural Composite Materials"
- 3-4 Norimichi Watanabe (NIMS) "Interface Characterization of Al/Co Laminated Film on a Si substrate using Variable Temperature TOF-SIMS"
- 3-5 Hiroaki Mamiya (NIMS) "Precipitation induced variation of mechanical and magnetic properties for X-750 superalloy"
- 3-6 Hongxin Wang (NIMS) "Advanced In Situ Multi-functional Characterization of High Strength CFRP Materials"
- 3-7 Tokuji Kizuka (U.Tsukuba) "3000 K Class Heating Action of Pulsed Electric Currents for High-Resolution Transmission Electron Microscopy of High Melting Point Metals"
- 3-8 Tomoo Terasawa (U.Tsukuba) "Development of 1300 K Class Heating Stages for Transmission Electron Microscopy of Thin Films"
- 4-1 Nagayasu Oshima (AIST) "Overview of theme 4: Positron Annihilation Spectroscopy based Research for the SIP-IMASM project"
- 4-2 Akira Uedono (U.Tsukuba) "Vacancy-Type Defects and Open Spaces in Solid-State Materials Probed by Means of Positron Annihilation"
- 4-3 Ken Wada (KEK) "Performance Test of a Pulse Stretch System for Material Sciences at KEK Slow Positron Facility"
- 4-4 ORourke Brian (AIST) "The AIST High-Intensity, Slow Positron Facility"
- 4-5 Lixian Jiang (AIST) "Investigation of near Surface Defects Induced by Electrical Discharge Machining in Steel by Positron Annihilation Spectroscopy"
- 4-6 Yoshihisa Harada (AIST) "Life Prediction based on Damage for Stainless Steel"

- 4-7 Shoji Ishibashi (AIST) "Two-Component Density Functional Study of Positron-monovacancy Interaction in Metals"
- 4-8 Shuhei Kozu (U.Tsukuba) "Evaluation of Damage by Laser Cutting Process in CFRP"
- 4-9 Gen Nakama (U.Tsukuba) "Failure and Damage Evaluation of Laser-joint in CFRP-Stainless Steel"