

6 Aug. (Mon) Kitakyushu International Conference Center

Main Hall

Opening Ceremony

Chair: Prof. Kouichi Nakano

9:20 – 9:30	Opening Address	Prof. Akira Kawasaki (President, Functionally Graded Materials Forum, Japan)
9:30 – 9:40	Congratulatory Address	Dr. Yuji Oie (President, Kyushu Institute of Technology)
9:40 – 9:50	Congratulatory Address	Guest of Honor

Plenary Lecture

Chair: Prof. Akira Kawasaki

9:50 – 10:40	PL-1	"Lessons learned with FGM development" Prof. Michael Gasik Aalto University Foundation, Finland
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10:40 – 11:00 Break

Room A

Modeling and Simulation I

Chairs: Prof. Vera Petrova and Prof. Kazunari Shinagawa

11:00 – 11:20	O-1	Dynamic behavior of a functionally graded coating subjected to moving contact with a semi-circular punch Mehmet N. Balci ¹ and Serkan Dag ² 1 Hacettepe University, Turkey 2 Middle East Technical University, Turkey
11:20 – 11:40	O-2 (Invited)	Dynamic Analysis of Functionally Graded Beams Asmita Rokaya and Jeongho Kim University of Connecticut, USA
11:40 – 12:00	O-3	Thermal Buckling of Functionally Graded Annular Micro-Plates with a Variable Length Scale Parameter Iman Eshraghi ¹ and Serkan Dag ² 1 University of Tehran, Iran 2 Middle East Technical University, Turkey
12:00 – 12:20	O-4	Thermal fracture of functionally graded materials: a semi-analytical model in application to thermal barrier coatings Vera Petrova ^{1,2} and Siegfried Schmauder ¹ 1 IMWF, University of Stuttgart, Germany 2 Voronezh State University, Russia
12:20 – 13:30		Exhibition & Lunch

Modeling and Simulation II

Chairs: Prof. Jeongho Kim and Prof. Kazunari Shinagawa

13:30 – 13:50	O-5	Time-dependent stress concentration reduction in graded material Guannan Wang ¹ and Marek-Jerzy Pindera ² 1 Texas Tech University, USA 2 University of Virginia, USA
13:50 – 14:10	O-6 (as P-1)	Multiscale grading of periodic materials Zhelong He and Marek-Jerzy Pindera University of Virginia, USA
14:10 – 14:30	O-7 (Invited)	Analysis of Sintering Behavior of Particle-Arrayed Structures by PFM/DEM Combined Method Kazunari Shinagawa Kyushu University, Japan
14:30 – 14:50	O-8	Micromechanical Homogenization of Elastic Moduli within Transverse Bamboo Cross Sections Xiaoyu Zhao ¹ and Guannan Wang ² 1 Shanghai University of Engineering Science, P. R. China 2 Texas Tech University, USA

Room B**Multi-dimensional printing I**

Chairs: Prof. Naoyuki Nomura and Prof. Soshu Kirihara

- 11:00 – 11:30 O-9 (*Keynote*) **Control of Crystallographic Orientation Fabricated by Additive Manufacturing of Beta-type Ti Alloys**
Takayoshi Nakano, Koji Hagihara and Takuya Ishimoto
Osaka University, Japan
- 11:30 – 11:50 O-10 **Effects of heterogeneous nucleus TiC particles on relative density and microstructure of selective laser melted Ti-6Al-4V**
Tadachika Chiba¹, Masafumi Sato¹, Hisashi Sato¹, Yoshimi Watanabe¹, Naoko Sato² and Shizuka Nakano²
1 Nagoya Institute of Technology (NIT), Japan
2 National Institute of Advanced Industrial Science and Technology (AIST), Japan
- 11:50 – 12:10 O-11 (*Invited*) **5D printer for FGM**
Fujio Tsumori
Kyushu University, Japan
- 12:10 – 13:30 **Exhibition & Lunch**

Thin Films and Coatings

Chairs: Prof. Chang-Chun Ge and Prof. Takashi Goto

- 13:30 – 13:50 O-12 **Preparation of Graded-Tungsten Coating by "Cold Spray + Chemical Vapor Deposition" Process for Nuclear Fusion Facilities**
Chang-Chun Ge¹, Xiao-Na Ren¹, Min Xia¹ and Peng Huang^{1,2}
1 University of Science and Technology Beijing, P. R. China
2 Southwest Jiaotong University, P. R. China
- 13:50 – 14:10 O-13 **A Normal Crack in a Functionally Graded Thermal Barrier Coating Bonded to a Homogeneous Elastic Substrate under Transient Thermal Loading**
Yuya Nakano and Sei Ueda
Osaka Institute of Technology, Japan
- 14:10 – 14:30 O-14 **Deposition of functionally graded wear-resistant coatings by a combination of pulsed arc evaporation and electro spark deposition**
Kuptsov K.A., Sheveyko A.N. and Shtansky D.V.
National University of Science and Technology "MISIS", Russia
- 14:30 – 14:50 O-15 **Oxidation Resistant Coatings of NbSi₂/Nb FGMs Layer for TiAl Intermetallic Compounds by Electron Beam Irradiation**
Katsuhiko Takagi¹, Toshimitsu Tetsui², Daisuke Yonekura¹ and Kazuhiro Hasezaki¹
1 Tokushima University, Japan
2 National Institute for Materials Science (NIMS), Japan
- 14:50 – 15:10 O-16 **Fabrication and Microstructure of Electrodeposited Cu-based Alloy Films Having High Composition Gradient**
(as P-11) Hiroyuki Hagiwara, Yoshihisa Kaneko and Makoto Uchida
Osaka City University, Japan

Room C**Spark Plasma Sintering for Industrialization I**

Chairs: Prof. Hiroshi Izui and Dr. Masao Tokita

- 11:00 – 11:20 O-17 (*Invited*) **Development of ZrO₂/Ti alloy FGMs Horn tip tool for Ultra-sonic Homogenizer by Spark Plasma Sintering (SPS) Method**
Masao Tokita¹, Yasuhiro Mitsu² and Hiroyuki Yoshida³
1 NJS Co.,Ltd., Japan; 2 Mitsui Electric Co.,Ltd., Japan
3 Chiba Industrial Technology Research Institute, Japan
- 11:20 – 11:40 O-18 **Development of lightning receptor for wind turbine blade by copper-graphite FGMs**
Toshiyuki Ueno¹, Takashi Yoshioka¹, Shuichi Asahina¹, Daisuke Nakasa², Yoshihiro Moriya² and Atsushi Minoda³,
1 Simane institute for industrial technology, Japan; 2 Moriya cutlery laboratory, Ltd, Japan
3 National institute of technology, Matsue college, Japan
- 11:40 – 12:00 O-19 **An Application of Weldable FGMs Cemented Carbide to Extruder Screw**
Y. Nakajima¹, Y. Miyakoshi¹, H. Takahashi¹, M. Tokita², H. Ando², K. Shimamura³ and K. Satoh³
1 Hokkaido Research Institute, Japan; 2 NJS Co., Ltd., Japan
3 Sapporo Kensaku Kogyo Co., Ltd., Japan
- 12:00 – 13:30 **Exhibition & Lunch**

Spark Plasma Sintering for Industrialization II

Chairs: Prof. Tatsuya Misawa and Dr. Masao Tokita

13:30 – 14:00 O-20 (*Keynote*) **Fabrication and Characterization of Functionally Graded Cylindrical Bars of Titanium Matrix Composites**
Hiroshi Izui, Naoya Hosokawa, Keisuke Kanazawa and Yoshiki Komiya
Nihon University, Japan

14:00 – 14:20 O-21 (*Invited*) **Heterogeneity of sintering temperature in the boundary between different materials and graphite die on Spark Plasma Sintering Process**
(as P-44) Tatsuya Misawa¹, Takumi Sakamaki², Yuji Kawakami¹ and Masakazu Kawahara³
1 Saga University, Japan; 2 National Institute of Technology, Kurume College, Japan
3 Kawahara SPS Technical Office, Japan

14:20 – 14:40 O-22 **Fabrication of FGMs Devices using Spark Plasma Sintering Technique**
Khaled Jabri¹, Tomohiro Sato¹ and Masao Tokita²
1 SINTER LAND INC., Ltd., Japan
2 NJS Co., Ltd., Japan

Poster Room

Poster session

15:10 – 17:00

P-1 ~ P-43

17:00 –

Banquet

7 Aug. (Tue) Kitakyushu International Conference Center

Room A

Thermoelectric Materials I

Chairs: Prof. Teruyuki Ikeda and Dr. Yoshikazu Shinohara

- 9:00 – 9:20 O-23 **Effects of Milling Rotational Speed on n-type $\text{Bi}_2\text{Te}_{2.67}\text{Se}_{0.33}$ Thermoelectric Semiconductors**
Kenichi Hanasaku and Kazuhiro Hasezaki
Tokushima University, Japan
- 9:20 – 9:40 O-24 **Thermal characteristics of energy cascade utilization system based on solar thermal power supply**
Koji Kusano, Yusuke Minami and Kazuhiro Hasezaki
Tokushima University, Japan
- 9:40 – 10:10 O-25 (Keynote) **Design and Synthesis of High Efficiency Peak to Peak (PtoP) type Thermoelectric Power Module Constructed by Functionally-Gradient-Layers**
SuDong Park, Jong Ho Park, Byungki Ryu, Jaywan Chung
Korea Electrotechnology Research Institute (KERI), South Korea
- 10:10 – 10:30 O-26 (Invited) **Theoretical Evaluation of Thermoelectric Materials with Uniform and Graded Structures for Thermoelectric Power Generation**
Yoshikazu Shinohara, Yoshiki Takagiwa, Yukihiro Isoda and Masahiro Goto
National Institute for Materials Science, Japan
- 10:30 – 10:50 Break

Thermoelectric Materials II

Chairs: Prof. Kazuhiro Hasezaki and Prof. Shinji Munetoh

- 10:50 – 11:10 O-27 (Invited) **Graphene promoted oxygen vacancies in perovskite for enhanced thermoelectric properties**
Yuchi Fan¹ and Akira Kawasaki²
1 Donghua University, P. R. China
2 Tohoku University, Japan
- 11:10 – 11:30 O-28 **Development of Low-cost and Non-toxic Thermoelectric Material for Sensor Application**
Yoshiki Takagiwa¹, Yukihiro Isoda¹, Masahiro Goto¹, Yoshikazu Shinohara¹, Akiko Saito², and Teruyuki Ikeda²
1 National Institute for Materials Science (NIMS), Japan
2 Ibaraki University, Japan
- 11:30 – 11:50 O-29 **An efficient way of exploring microstructure and thermoelectric properties of multicomponent systems using composition-graded bulk materials**
Akiko Saitoh¹, Hiroto Nishimine¹, Ayako Ikeda², Yoshiki Takagiwa², Tsuyoshi Nishi¹, Hiromichi Ohta¹, and Teruyuki Ikeda¹
1 Ibaraki University, Japan; 2 National Institute for Materials Science, Japan
- 11:50 – 12:10 O-30 (Invited) **Thermal probe method analysis for $\text{Ba}_8\text{Au}_x\text{Si}_{46-x}$ single crystal clathrate with Au composition gradient**
Shinji Munetoh, Yuuki Osakabe and Keita Yamasoto
Kyushu University, Japan
- 12:10 – 13:30 Exhibition & Lunch

Room B

Surface and Interface

Chairs: Dr. Hiroki Kurita and Prof. Hitoshi Kohri

- 9:10 – 9:30 O-31 (Invited) **Attempt to Increase the Toughness of Biodegradable Resin**
Hitoshi Kohri¹, Yuta Watanabe¹, Hiroyuki Tsukumo² and Yasumi Yuma²
1 Kogakuin University, Japan
2 KSK CO., LTD, Japan
- 9:30 – 9:50 O-32 **Joining of 93W Alloy and Mo1 Alloy with a Cu Interlayer by Plasma Activated Sintering**
Mei Rao, Jiahui Ding, Jian Zhang, Guoqiang Luo, Qiang Shen and Lianmeng Zhang
Wuhan University of Technology, P. R. China
- 9:50 – 10:10 O-33 **Structural Difference in Aluminum/Carbon Fiber Interface of Carbon Fiber Reinforced Aluminum Matrix Composites Fabricated by Two Different Powder Metallurgical Processes**
Grégory Laret¹, Hiroki Kurita², Jean-Marc Heinz³ and Jean-François Silvain¹
1 ICMCB-CNRS, France; 2 Shizuoka University, France
3 ENSCBP, France

10:10 – 10:30 O-34 **Development of surface treatment to realize novel biomaterial realize both tissue compatibility and antibacterial property**
Yusuke Tsutsumi, Masaya Shimabukuro, Peng Chen, Maki Ashida, Hisashi Doi and Takao Hanawa
Tokyo Medical and Dental University, Japan

10:30 – 10:50 Break

Biological and Optical Functions I

Chairs: Prof. Takayuki Narushima and Prof. Kouichi Nakano

10:50 – 11:10 O-35 *(Invited)* **Functionally Graded Metal Implants with Ability of Bone Integration**
Toshiki Miyazaki
Kyushu Institute of Technology, Japan

11:10 – 11:30 O-36 *(Invited)* **Several Boundaries and Functionally Graded Layers -Study on Biofilms that have Functionally Graded Characteristics on the Boundaries-**
Kouichi Nakano
Kyushu Institute of Technology, Japan

11:30 – 11:50 O-37 **Using Regenerated Cellulose as Adhesives in Cellulose-based Green Composites**
K. Suzuki, A. N. Nakagaito and H. Takagi
Tokushima University, Japan

11:50 – 12:10 O-38 **Preparation of Microcapsules coated with Styrene-modified CNF using Supercritical Carbon dioxide**
(as P-30) Shinichi Tokunaga, Kenji Mishima, Taku M. Aida, Tanjina Sharmin and Miyuki Nakamura
Fukuoka University, Japan

12:10 – 13:30 Exhibition & Lunch

Room C

Centrifugal Processing

Chairs: Prof. Takahiro Kunimine and Prof. Yoshimi Watanabe

9:10 – 9:30 O-39 **Fabrication of Cu Alloy-Based Self-Lubricating Functionally Graded Materials by Combination of Centrifugal Mixed-Powder Method and Aging Treatment**
Hisashi Sato, Tomoaki Kayano, Tadachika Chiba and Yoshimi Watanabe
Nagoya Institute of Technology, Japan

9:30 – 9:50 O-40 **Metal-Matrix FGMs with Matrix-Composition Gradient Processed by Centrifugal Sintered-Casting**
Takahiro Kunimine¹, Motoko Yamada², Hisashi Sato² and Yoshimi Watanabe²
1 Kanazawa University, Japan
2 Nagoya Institute of Technology, Japan

9:50 – 10:10 O-41 *(Invited)* **Fabrication of FGMs under Centrifugal Force and Their Some Applications**
Yoshimi Watanabe
Nagoya Institute of Technology, Japan

10:10 – 10:30 O-42 **Horizontal Type FGMs Manufacturing System under the Centrifugal Force, NOC 2000**
Yasumasa Oya¹, Hisashi Sato² and Yoshimi Watanabe²
1 OHYA-CHUZOSHO Co., Ltd., Japan
2 Nagoya Institute of Technology, Japan

10:30 – 10:50 Break

Multifunctions

Chairs: Prof. Thorsten Gerdes and Prof. Makoto Kobashi

10:50 – 11:20 O-43 *(Keynote)* **Copper/diamond functionally graded materials**
J.-F. Silvain^{1,2}, C. Azina^{1,2}, Y.F. Lu² and J.-L. Battaglia¹
1 CNRS, University of Bordeaux, France
2 University of Nebraska-Lincoln, USA

11:20 – 11:40 O-44 **Fabrication and Characterization of Al-Cu System Graded Impactors in Light Gas Gun Experiments**
Jianian Hu, Guoqiang Luo, Jiqin Chen, Jian Zhang, Qiang Shen and Lianmeng Zhang
Wuhan University of Technology, P. R. China,

11:40 – 12:00 O-45 *(Invited)* **Functionally graded carbon nanotube reinforced aluminum matrix composite tube fabricated by hot extrusion process**
Hansang Kwon^{1,2}, Kwangjae Park¹, Dasom Kim¹, Jehong Park², Seungchan, Cho³, Akira Kawasaki⁴ and Kwonhoo Kim¹,
1 Pukyong National University, South Korea; 2 Next Generation Materials Co., Ltd., South Korea; 3 South Korea Institute of Materials Science, South Korea; 4 Tohoku University, Japan

12:00 – 13:30 Exhibition & Lunch

Main Hall

Plenary Lecture

Chair: Dr. Yoshikazu Shinohara

13:30 – 14:20 PL-2

"Manufacture and properties of layered, graded and 3D anisotropic materials for applications in communications and energy storage"

Prof. Patrick S. Grant
Department of Materials, University of Oxford, UK

14:20 – 14:40

Break

Room A

Structural Analysis and Design I

Chairs: Dr. Daria Sidorenko and Prof. Fumio Narita

14:40 – 15:10 O-46

(keynote) **Electro-elastodynamic Behavior of Functionally Graded Piezoelectric Thin Plates**

Fumihiro Ashida¹, Takuya Morimoto¹ and Hidenori Ozaki²
1 Shimane University, Japan
2 OPTON Co. Ltd., Japan

15:10 – 15:30 O-47

Modelling of Functionally Graded Micro-beams with Variable Length Scale Parameters

Reza Aghazadeh, Serkan Dag and Ender Cigeroglu
Middle East Technical University, Turkey

15:30 – 15:50 O-48

(Invited) **Finite Element Analysis and Design of Flexible Functionally Graded Piezocomposites - Toward Effective Vibration and Temperature Energy Harvesting Materials**

Kotaro Mori¹, Zhenjin Wang² and Fumio Narita²
1 Ibaraki University, Japan
2 Tohoku University, Japan

15:50 – 16:10 O-49

Multiscale simulation of multiferroic composite materials

Shota Fukui and Yasutomo Uetsuji
Osaka Institute of Technology, Japan

16:10 – 16:30 O-50

Modern Design of Diamond Cutting Tools: Mechanical Alloying, Nanomodification, Functional Graded Coatings

Daria Sidorenko, Pavel Loginov and Evgeny Levashov
National University of Science and Technology "MISIS", Russia

16:30 – 16:50 O-51

Particle Size Effects on Mechanical Properties of Wood Plastic Composites

Naoyuki Shiraishi¹, Yasutomo Uetsuji¹ and Hirokazu Ito²
1 Osaka Institute of Technology, Japan
2 National Institute of Advanced Industrial Science and Technology, Japan

Room B

Multi-dimensional printing II

Chairs: Prof. Fujio Tsumori and Prof. Soshu Kiriara

14:40 – 15:00 O-52

(Invited) **Trial of functionally-graded Zr-based alloy builds for biomedical applications**

Naoyuki Nomura, Torun Gözden, Keiko Kikuchi and Akira Kawasaki
Graduate School of Engineering, Tohoku University, Japan

15:00 – 15:20 O-53

Cladded layer with graded composition WC/Co using Laser Metal Deposition

Yorihiro Yamashita¹, Yoshinori Funada¹, Takahiro Kunimine², Yuji Sato³ and Masahiro Tsukamoto³
1 Industrial Research Institute of Ishikawa, Japan; 2 Kanazawa University, Japan
3 Osaka University, Japan

15:20 – 15:40 O-54

(Invited) **Stereolithographic Additive Manufacturing of Metal and Ceramic Components with Functional Geometries**

Soshu Kiriara
Osaka University, Japan

15:40 – 15:50

Short Break

Biological and Optical Functions II

Chairs: Prof. Toshiaki Miyazaki and Prof. Kouichi Nakano

15:50 – 16:10 O-55

(Invited) **Formation and Antibacterial Activity of TiO₂ Layers on Ti-Au Alloys**

Takayuki Narushima, Kyosuke Ueda, Takatoshi Ueda and Naoki Sato
Tohoku University, Japan

16:10 – 16:30 O-56 **Evaluation of Optical Properties on FGPJ between Cu and SUS304 for Quality Assurance**
(as P-26) Kazuki Iwakiri and Kouichi Nakano
Engineering Kyushu Institute of Technology, Japan

16:30 – 16:50 O-57 **Effect of Thermo-mechanical Processing on Microstructure and Mechanical Properties of Harmonic-structure Pure Copper**
Guodong Li^{1,2}, Shuichi Morinaka², Mie Kawabata², Chaoli Ma¹ and Kei Ameyama²
1 Beihang University, P. R. China;
2 Ritsumeikan University, Japan

Room C

Processings

Chairs: Dr. J-F Silvain and Prof. Hansang Kwon

14:40 – 15:00 O-58 **Preparation of AlN/Mo Functionally Graded Materials by Tape Casting and Spark Plasma Sintering**
Yueqi Wu, Fei Chen, Mei Huang, Qiang Shen and Lianmeng Zhang
Wuhan university of technology, P. R. China,

15:00 – 15:20 O-59 *(Invited)* **Compositionally and porosity graded metal-ceramic composite for thermal barrier applications**
Christian Richter, Monika Willert-Porada, Andreas Rosin, Walter Krenkel and Thorsten Gerdes
University of Bayreuth, Germany

15:20 – 15:40 O-60 **Effect of Al/Ni Molar Ratio on Cell Morphology and Constituting Phase of Porous Ni-Al Intermetallic Compounds**
Yunmao Shu, Asuka Suzuki, Naoki Takata and Makoto Kobashi
Nagoya University, Japan

15:40 – 16:00 O-61 *(Invited)* **Formation of Oriented and Graded Grain Structure in Fe-Cu-C Alloy by Liquid Phase Sintering and Carburization**
Ryuzo Watanabe¹, Yasuaki Okita² and Akira Kawasaki³
1 Japan Aerospace Technology Foundation, Japan; 2 JFE Steel Corp., Japan
3 Tohoku Univ., Japan

16:00 – 16:20 O-62 **Boron carbide reinforced Al composite plate fabricated by casting followed by rolling process**
Seungchan Cho, Donghyun Lee, Sangmin Shin, Ilguk Jo, Sang-Kwan Lee and Sang-Bok Lee
Korea Institute of Materials Science (KIMS), South Korea

16:20 – 16:40 O-63 **Bonding strength of Al/resin joint via functionally graded interpenetrating phase layer**
Asuka Suzuki¹, Yuta Arai², Naoki Takata¹ and Makoto Kobashi¹
1 Nagoya University, Japan
2 Nagoya University (Currently: The Japan Commercial Broadcasters Association)

17:00 –

Memorial Ceremony of Prof. M. Willert-Porada and Prof. T. Hirai

Room A

Structural Analysis and Design II

Chairs: Prof. Yan Shi and Prof. Yasutomo Uetsuji

- 9:00 – 9:20 O-64 **A Crack Parallel to the Interface Between a Functionally Graded Thermal Barrier Coating and a Homogeneous Elastic Substrate under Transient Thermal Loading**
Yasuhiko Masaoka and Sei Ueda
Osaka Institute of Technology, Japan
- 9:20 – 9:40 O-65 (Invited) **Plane axisymmetric unsteady thermal stress in an inhomogeneous hollow circular cylinder due to cyclic heat supply**
Hiromu Kanemaru¹, Ryuusuke Kawamura¹ and Yoshinobu Tanigawa²
1 University of Miyazaki, Japan
2 Professor Emeritus, Osaka Prefecture University, Japan
- 9:40 – 10:00 O-66 **Design, Fabrication and Characterization of Fe-Co Magnetostrictive Fiber/Epoxy Composite Materials with Villari Effect**
Kenichi Katabira¹, Yu Yoshida¹, Atsuji Masuda², Akihito Watanabe³ and Fumio Narita¹
1 Tohoku University, Japan; 2 Industrial Technology Center of Fukui Prefecture, Japan
3 Sakase Adtech Co., Ltd., Japan
- 10:00 – 10:20 O-67 **Direction-switchable functionally graded acoustic diodes**
Yingjie Chen, Yang Huang and Weiqiu Chen
Zhejiang University, P. R. China
- 10:20 – 10:40 O-68 (Invited) **Assembly of Isolated Three-Dimensional Origami Structures and Their Applications**
Yan Shi¹, Yihui Zhang² and Cunfa Gao¹
1 Nanjing University of Aeronautics & Astronautics, P. R. China
2 Tsinghua University, P. R. China.
- 10:40 – 11:10 Break

Room B

Environmental Coatings and Evaluation

Chairs: Prof. Masahiko Kato and Prof. Hiroyuki Waki

- 9:00 – 9:30 O-69 (Keynote) **Functionally Graded Thermal Barrier Coatings Fabricated by Cold Spray**
Kazuhiro Ogawa, Takumi Kitahara and Yuji Ichikawa
Tohoku University, Japan
- 9:30 – 9:50 O-70 (Invited) **Influence of Heat Cycles on Hardness and Young's Modulus of Thermal Barrier Coatings Measured by Nano-indenter**
Masahiko Kato¹, Taichi Iwata², Hiroyuki Akebono² and Atsushi Sugeta²
1 Fukuyama University, Japan
2 Hiroshima University, Japan
- 9:50 – 10:10 O-71 **Effect of Heat Treatment on Young's Modulus and Poisson's Ratio of Thermal Barrier Coating Evaluated by Bending of Three-Layered Specimen**
Tomoyuki Hayase and Hiroyuki Waki
Iwate University, Japan
- 10:10 – 10:30 O-72 (Invited) **Thermal diffusivity of thermal barrier coating from room temperature up to high temperature**
Megumi Akoshima¹ and Satoru Takahashi²
1 National Metrology Institute of Japan, AIST, Japan
2 Tokyo Metropolitan University, Japan
- 10:30 – 10:50 O-73 (Invited) **Evaluation of Thermal Conductivity for Suspension Plasma Sprayed Mullite Coating**
Keiko Kikuchi¹, Naoyuki Nomura¹, Akira Kawasaki¹, Kazuo Noda², Mikako Nagao², Yoichiro Habu² and Yoshiyasu Itoh²
1 Tohoku University, Japan; 2 TOCALO Co., Ltd, Japan
- 10:50 – 11:10 Break

Room C

Manufacturings

Chairs: Prof. Michael Gasik and Dr. Seungchan Cho

- 9:20 – 9:40 O-74 **Fabrication And Characterization Of Functionally Graded Fe/W Composites**
(as P-47) S. Heuer¹, J. Matejíček², M. Vilémová², T. Lienig¹, G. Pintsuk¹, J.W. Coenen¹, W. Theisen³ and Ch. Linsmeier¹,
1 Institut für Energie und Klimaforschung -Plasmaphysik, Germany; 2 Institute of Plasma Physics AS CR, v. v. i.,
Department of Materials, Czech Republic; 3 Lehrstuhl Werkstofftechnik, Ruhr-Universität Bochum, Germany

9:40 – 10:00 O-75

Construction of $\text{LiCoO}_2\text{-Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ Graded Composite Cathode Materials for All-solid-state Batteries

Shangbin Song, Fei Chen, Wenping Zha, Dunjie Yang, Qiang Shen and Lianmeng Zhang
Wuhan university of technology, P. R. China

10:00 – 10:20 O-76

Fabrication of microstructure gradation in Ti-48Al-2Cr-2Nb alloys by electron beam melting

M. Todai¹, T. Nakano², J.Y. Oh², K. Cho², H.Y. Yasuda², K. Hagihara², A. Ikeda³, M. Ueda⁴, and M. Takeyama⁵
1 Institute of Niihama National College of Technology, Japan; 2 Osaka University, Japan; 3 National Institute for Materials Science, Japan; 4 Metal Technology Co. Ltd., Japan; 5 Tokyo Institute of Technology, Japan

10:20 – 11:10

Break

Main Hall

Closing Ceremony

Chair: Prof. Shinji Munetoh

11:10 – 11:40

Closing Address

Prof. Akira Kawasaki (President, Functionally Graded Materials Forum, Japan)

11:40 – 13:00

Exhibition & Lunch

13:00 – 17:30

Technical Tour