

**Main Hall**

**Opening Ceremony**

Chair: Prof. Kouichi Nakano

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

**Plenary Lecture**

Chair: Prof. Akira Kawasaki

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

**Room A**

**Modeling and Simulation I**

Chairs: Prof. Serkan Dag and Prof. Kazunari Shinagawa

11:00 – 11:20	O-1	<b>Dynamic behavior of a functionally graded coating subjected to moving contact with a semi-circular punch</b> Mehmet N. Balci <sup>1</sup> and Serkan Dag <sup>2</sup> 1 Hacettepe University, Turkey 2 Middle East Technical University, Turkey
11:20 – 11:40	O-2 (Invited)	<b>Dynamic Analysis of Functionally Graded Beams</b> Asmita Rokaya and Jeongho Kim University of Connecticut, USA
11:40 – 12:00	O-3	<b>Thermal Buckling of Functionally Graded Annular Micro-Plates with a Variable Length Scale Parameter</b> Iman Eshraghi <sup>1</sup> and Serkan Dag <sup>2</sup> 1 University of Tehran, Iran 2 Middle East Technical University, Turkey
12:00 – 12:20	O-4	<b>Thermal fracture of functionally graded materials: a semi-analytical model in application to thermal barrier coatings</b> Vera Petrova <sup>1,2</sup> and Siegfried Schmauder <sup>1</sup> 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	<b>Time-dependent stress concentration reduction in graded material</b> Guannan Wang <sup>1</sup> and Marek-Jerzy Pindera <sup>2</sup> 1 Texas Tech University, USA 2 University of Virginia, USA
13:50 – 14:10	O-6	<b>Multiscale grading of periodic materials</b> Zhelong He and Marek-Jerzy Pindera University of Virginia, USA
14:10 – 14:30	O-7 (Invited)	<b>Analysis of Sintering Behavior of Particle-Arrayed Structures by PFM/DEM Combined Method</b> Kazunari Shinagawa Kyushu University, Japan
14:30 – 14:50	O-8	<b>Micromechanical Homogenization of Elastic Moduli within Transverse Bamboo Cross Sections</b> Xiaoyu Zhao <sup>1</sup> and Guannan Wang <sup>2</sup> 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)	<b>Control of Crystallographic Orientation Fabricated by Additive Manufacturing of Beta-type Ti Alloys</b>
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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 Chiba<sup>1</sup>, Masafumi Sato<sup>1</sup>, Hisashi Sato<sup>1</sup>, Yoshimi Watanabe<sup>1</sup>, Naoko Sato<sup>2</sup> and Shizuka Nakano<sup>2</sup>  
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 Ge<sup>1</sup>, Xiao-Na Ren<sup>1</sup>, Min Xia<sup>1</sup> and Peng Huang<sup>1,2</sup>  
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 NbSi<sub>2</sub>/Nb FGMs Layer for TiAl Intermetallic Compounds by Electron Beam Irradiation**

Katsuhiro Takagi<sup>1</sup>, Toshimitsu Tetsui<sup>2</sup>, Daisuke Yonekura<sup>1</sup> and Kazuhiro Hasezaki<sup>1</sup>  
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**

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 ZrO<sub>2</sub>/Ti alloy FGMs Horn tip tool for Ultra-sonic Homogenizer by Spark Plasma Sintering (SPS) Method**

Masao Tokita<sup>1</sup>, Yasuhiro Mitsui<sup>2</sup> and Hiroyuki Yoshida<sup>3</sup>  
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 Ueno<sup>1</sup>, Takashi Yoshioka<sup>1</sup>, Shuichi Asahina<sup>1</sup>, Daisuke Nakasa<sup>2</sup>, Yoshihiro Moriya<sup>2</sup> and Atsushi Minoda<sup>3</sup>,  
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. Nakajima<sup>1</sup>, Y. Miyakoshi<sup>1</sup>, H. Takahashi<sup>1</sup>, M. Tokita<sup>2</sup>, H. Ando<sup>2</sup>, K. Shimamura<sup>3</sup> and K. Satoh<sup>3</sup>  
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**

Tatsuya Misawa<sup>1</sup>, Takumi Sakamaki<sup>2</sup>, Yuji Kawakami<sup>1</sup> and Masakazu Kawahara<sup>3</sup>  
1 Saga University, Japan; 2 National Institute of Technology, Kurume Collage, Japan  
3 Kawahara SPS Technical Office, Japan

14:20 – 14:40 O-22

**Fabrication of FGMS Devices using Spark Plasma Sintering Technique**

Khaled Jabri<sup>1</sup>, Tomohiro Sato<sup>1</sup> and Masao Tokita<sup>2</sup>  
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**

Aug. 7 (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 Fan<sup>1</sup> and Akira Kawasaki<sup>2</sup>  
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 Takagiwa<sup>1</sup>, Yukihiro Isoda<sup>1</sup>, Masahiro Goto<sup>1</sup>, Yoshikazu Shinohara<sup>1</sup>, Akiko Saito<sup>2</sup>, and Teruyuki Ikeda<sup>2</sup>  
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 Saitoh<sup>1</sup>, Hiroto Nishimine<sup>1</sup>, Ayako Ikeda<sup>2</sup>, Yoshiki Takagiwa<sup>2</sup>, Tsuyoshi Nishi<sup>1</sup>, Hiromichi Ohta<sup>1</sup>, and Teruyuki Ikeda<sup>1</sup>  
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: Prof. Rong Tu and Prof. Hitoshi Kohri

- 9:10 – 9:30 O-31 (Invited) **Attempt to Increase the Toughness of Biodegradable Resin**  
Hitoshi Kohri<sup>1</sup>, Yuta Watanabe<sup>1</sup>, Hiroyuki Tsukumo<sup>2</sup> and Yasumi Yuma<sup>2</sup>  
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 Laret<sup>1</sup>, Hiroki Kurita<sup>2</sup>, Jean-Marc Heinz<sup>3</sup> and Jean-François Silvain<sup>1</sup>  
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. Toshiki Miyazaki 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**

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 Kunimine<sup>1</sup>, Motoko Yamada<sup>2</sup>, Hisashi Sato<sup>2</sup> and Yoshimi Watanabe<sup>2</sup>  
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 Oya<sup>1</sup>, Hisashi Sato<sup>2</sup> and Yoshimi Watanabe<sup>2</sup>  
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<sup>1,2</sup>, C. Azina<sup>1,2</sup>, Y.F. Lu<sup>2</sup> and J.-L. Battaglia<sup>1</sup>  
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<sup>1,2</sup>, Kwangjae Park<sup>1</sup>, Dasom Kim<sup>1</sup>, Jehong Park<sup>2</sup>, Seungchan, Cho<sup>3</sup>, Akira Kawasaki<sup>4</sup> and Kwonhoo Kim<sup>1</sup>,  
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**

Fumihiko Ashida<sup>1</sup>, Takuya Morimoto<sup>1</sup> and Hidenori Ozaki<sup>2</sup>  
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 Mori<sup>1</sup>, Zhenjin Wang<sup>2</sup> and Fumio Narita<sup>2</sup>  
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 Shiraishi<sup>1</sup>, Yasutomo Uetsuji<sup>1</sup> and Hirokazu Ito<sup>2</sup>  
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 Kirihara

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 Yamashita<sup>1</sup>, Yoshinori Funada<sup>1</sup>, Takahiro Kunimine<sup>2</sup>, Yuji Sato<sup>3</sup> and Masahiro Tsukamoto<sup>3</sup>  
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 Kirihara  
Osaka University, Japan

15:40 – 15:50

Short Break

**Biological and Optical Functions II**

Chairs: Prof. Takayuki Narushima and Prof. Kouichi Nakano

15:50 – 16:10 O-55

**(Invited) Formation and Antibacterial Activity of TiO<sub>2</sub> 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**

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<sup>1,2</sup>, Shuichi Morinaka<sup>2</sup>, Mie Kawabata<sup>2</sup>, Chaoli Ma<sup>1</sup> and Kei Ameyama<sup>2</sup>  
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 Carburation**  
Ryuzo Watanabe<sup>1</sup>, Yasuaki Okita<sup>2</sup> and Akira Kawasaki<sup>3</sup>  
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 Suzuki<sup>1</sup>, Yuta Arai<sup>2</sup>, Naoki Takata<sup>1</sup> and Makoto Kobashi<sup>1</sup>  
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 Kanemaru<sup>1</sup>, Ryuusuke Kawamura<sup>1</sup> and Yoshinobu Tanigawa<sup>2</sup>  
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 Katabira<sup>1</sup>, Yu Yoshida<sup>1</sup>, Atsuji Masuda<sup>2</sup>, Akihito Watanabe<sup>3</sup> and Fumio Narita<sup>1</sup>  
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 Shi<sup>1</sup>, Yihui Zhang<sup>2</sup> and Cunfa Gao<sup>1</sup>  
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 Kato<sup>1</sup>, Taichi Iwata<sup>2</sup>, Hiroyuki Akebono<sup>2</sup> and Atsushi Sugeta<sup>2</sup>  
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 Akoshima<sup>1</sup> and Satoru Takahashi<sup>2</sup>  
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 Kikuchi<sup>1</sup>, Naoyuki Nomura<sup>1</sup>, Akira Kawasaki<sup>1</sup>, Kazuo Noda<sup>2</sup>, Mikako Nagao<sup>2</sup>, Yoichiro Habu<sup>2</sup> and Yoshiyasu Itoh<sup>2</sup>  
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 **State of the Art Functionally Graded Materials: Classifications from Industrial Point of View**  
I. M. El-Galy, B. I. Bassiouny and M. H. Ahmed  
Alexandria University, Egypt
- 9:40 – 10:00 O-75 **Fabrication And Characterization Of Functionally Graded Fe/W Composites**



S. Heuer<sup>1</sup>, J. Matejíček<sup>2</sup>, M. Vilémová<sup>2</sup>, T. Lienig<sup>1</sup>, G. Pintsuk<sup>1</sup>, J.W. Coenen<sup>1</sup>, W. Theisen<sup>3</sup> and Ch. Linsmeier<sup>1</sup>,  
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

10:00 – 10:20 O-76

**Construction of LiCoO<sub>2</sub>-Li<sub>7</sub>La<sub>3</sub>Zr<sub>2</sub>O<sub>12</sub> 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

10:20 – 10:40 O-77

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

M. Todai<sup>1</sup>, T. Nakano<sup>2</sup>, J.Y. Oh<sup>2</sup>, K. Cho<sup>2</sup>, H.Y. Yasuda<sup>2</sup>, K. Hagihara<sup>2</sup>, A. Ikeda<sup>3</sup>, M. Ueda<sup>4</sup>, and M. Takeyama<sup>5</sup>  
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

10:40 – 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**