

**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**