Symposium 4: Green and Smart Processing

Main Organizers
- Soshu Kirihara, Osaka University, Japan
- Kiyoshi Hirao, AIST, Japan
- Zoltan Lences, Slovak Academy of Sciences, Slovakia

Co-Organizers
- Yuji Iwamoto, Nagoya Institute of Technology, Japan
- Mohammed Es-Souni, University of Applied Sciences of Kiel , Germany
- Hai-Doo Kim, Korea Institute of Materials Science, Korea
- Yoshitake Masuda, AIST, Japan
- Toshiyuki Nishimura, NIMS, Japan
- Nitin P. Padture, The Ohio State University, USA
- Pavol Sajgalik, Slovak Academy of Sciences, Slovakia
- Dr. Di Zhang, Shanghai Jiao Tong University, China
- You Zhou, AIST, Japan

Oral Session

Wednesday, November 17

Room: 1001

9:00 - 10:30: Smart and Green Forming Process (I)

Chairs: Rainer Gadow (University of Stuttgart, Germany) and Soshu Kirihara (Osaka University, Japan)

9:00 - 9:30
S4-001 **Novel Nitride Ceramics with the Potential for the Bio-Applications (Invited)**
P. Šajgalík[1], M. Hnatko[1], Z. Lenčéš[1], P. Čopan[2]; [1]Slovak Academy of Sciences, Slovak Republic, [2]Slovak Technical University, Slovak Republic

9:30 - 9:45
S4-002 **Environmentally Sound Production of Thin Alumina Sheets by Aqueous Tape Casting**
J. Stiernstedt[1], G. Rossiquet[2], M. Cristea[1], E. Carlström[1]; [1]Swerea IVF, Sweden, [2]Saint-Gobain CREE, France

9:45 - 10:00
S4-003 **Building Laminated Al_2O_3 Substrates with Ti_2AlC Screen Printed Conductor Lines for High Temperature and High Power Applications**
E. Carlström[1], L. Palmpqvist[2], J. Stiernstedt[1]; [1]Swerea IVF, Sweden, [2]formerly Swerea IVF now with SCA, Sweden

10:00 - 10:15
S4-004 **Fabrication of Functionally Graded Ceramics Using a Novel Combination of Freeze Casting and Electrophoretic Deposition (EPD)**
A. Preiss, B. Su; University of Bristol, UK

10:15 - 10:30
S4-005 **Biogenic Cements from Rice Hull: Experimental and Theoretical Aspects**
F. A. Rodrigues, C. S. Shida, M. B. R. Oliveira, D. R. M. Paixão; Universidade de Mogi das Cruzes, Brazil

10:30 - 10:45 **Break**

Symposium 4

10:45 - 12:00: Smart Forming Process for 3D Structure (I)

Chairs: Pavol Sajgalik (Slovak Academy of Sciences, Slovakia) and Jingxian Zhang (Shanghai Institute of Ceramics, China)

10:45 - 11:15

S4-006 **High Velocity Suspension Flame Spraying (HVSFS) – a Promising Coating Process for the Application of Nanostructured Tribofunctional Coatings (Invited)**
R. Gadow, A. Killinger, A. Manzat; University of Stuttgart, Germany

11:15 - 11:30

S4-007 **Three-dimensional SiO_2 Surfaces Fabricated Using Nonlinear Lithography**
H. Nishiiyama[1], Y. Hirata[2], J. Nishii[1]; [1]Hokkaido University, Japan, [2]Osaka University, Japan

11:30 - 11:45

S4-008 **Thermoreversible Gelling Slurry for Solid Freeforming Fabrication**
A. Kondo, K. Kuruma, H. Abe, M. Naito; Osaka University, Japan

11:45 - 12:00

S4-009 **Development of Thermodynamic Crystals to Control Heat and Stress Flows by Using Micro Exposing Stereolithography**
S. Kirihara, Y. Uehara, S. Tasaki; Osaka University, Japan

13:15 - 14:00: Smart Forming Process for 3D Structure (II)

Chairs: Elis Carlstrom (Swerea IVF,, Sweden) and
Hideki Kita (National Institute of Advanced Industrial Science and Technology, Japan)

13:15 - 13:30

S4-010 **Fabrication of Terahertz Wave Resonators with Alumina Diamond Potonic Crystals for Frequency Amplifications in Water Solvents**
N. Ohta, T. Niki, S. Kirihara; Osaka University, Japan

13:30 - 13:45

S4-011 **Fabrication of Metarodielectric Photonic Crystals for Microwave Control**
Y. Takinami, S. Kirihara; Osaka University, Japan

13:45 - 14:00

S4-012 **Accurate Fabrication of Hydroxyapatite Bone Models with Porous Scaffold Structures by Using Stereolithography**
C. Maeda, S. Kirihara; Osaka University, Japan

14:00 - 15:00: Smart and Green Forming Process (II)

Chairs: Elis Carlstrom (Swerea IVF,, Sweden) and Hideki Kita (National Institute of Advanced Industrial Science and Technology, Japan)

14:00 - 14:15

S4-013 **Aqueous Gelcasting of Boron Carbide**
J. Zhang, D. Jiang, Z. Chen, Q. Lin; Chinese Academy of Sciences, China

14:15 - 14:30

S4-014 **Application of New Low Toxic Monomers in Gelcasting Process of Alumina Powder**
A. Szudarska[1], T. Mizerski[1], Y. Sakka[2], M. Szafran[1]; [1]Warsaw University of Technology, Poland, [2]National Institute for Materials Science, Japan

14:30 - 14:45

S4-015 **Aqueous Tape Casting of Alumina using an Emulsion of Urethane Polymer**
T. Takaishi[1], H. Inada[1], M. Sato[1], S. Sano[2], S. Kawakami[2]; [1]Kyoto Municipal Industrial Research Institute, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

14:45 - 15:00
S4-016 **High Efficient Grinding Wheels for Machining Sapphire**
K. Matsumaru[1], Y. Imai[1], A. Takata[2], K. Ishizaki[1]; [1]Nagaoka University of Technology, Japan, [2]Nano-TEM Co., Ltd., Japan

15:00 - 15:15 **Break**

15:15 - 17:15: Stereo Fabric Forming Process

Chairs: Zoltan Lences (Slovak Academy of Sciences, Slovakia) and
You Zhou (National Institute of Advanced Industrial Science and Technology, Japan)

15:15 - 15:30
S4-017 **Stereo Fabric Modeling Technology in Manufacturing of Ceramics (Invited)**
H. Kita, H. Hyuga, T. Nagaoka, N. Kondo; National Institute of Advanced Industrial Science and Technology, Japan

15:30 - 15:45
S4-018 **Stereo Fabric Modeling Technology for Semiconductor Production Equipment**
N. Shino; Stereo Fabric Research Association, Japan

15:45 - 16:00
S4-019 **Joining of SiC Based Ceramics by a Reaction Sintering Technique**
T. Ide[1], H. Hyuga[2], H. Kita[2]; [1]Stereo Fabric Research Association, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

16:00 - 16:15
S4-020 **Low Temperature Joining Process for Carbide Ceramics**
K. Sekine[1], T. Kumazawa[2], H. Hyuga[3], H. Kita[3]; [1]Stereo Fabric Research Association, Japan, [2]Mino Ceramic Co.,Ltd., Japan, [3]National Institute of Advanced Industrial Science and Technology, Japan

16:15 - 16:30
S4-021 **Development of Joining Technique of Alumina Ceramics Using Reaction Bonding Aluminum Oxide Materials**
Y. Izutsu[1], H. Miyazaki[2], N. Kondo[2], H. Hyuga[2], H. Kita[2]; [1]Stereo Fabric Reserch Association, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

16:30 - 16:45
S4-022 **Development of Insulated and Lightened Furnace Equipments for Molten Aluminum by Stereo Fabric Modelling Technology**
I. Himoto[1], T. Nagaoka[2], H. Kita[2]; [1]Stereo Fabric Research Association, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

16:45 - 17:00
S4-023 **Microwave Local Heating of Silicon Nitride for Joining**
N. Kondo, H. Hyuga, H. Kita, K. Hirao; National Institute of Advanced Industrial Science and Technology, Japan

17:00 - 17:15
S4-024 **Continuous Laser Furnace for Surface Processing of Ceramics and Glass**
V. V. Lennikov, I. de Francisco, L. C. Estepa, G. F. de la Fuente; Instituto de Ciencia de Materiales de Aragón, Spain

Symposium 4

Thursday, November 18

9:00 - 10:30: Smart Processing for Functional Ceramics

Chairs: Christian Kaps (Bauhaus-University Weimar, Germany) and Koji Inoue (Mie Industrial Research Institute, Japan)

9:00 - 9:15
S4-025 **Oxygen Storaging Behaviour of the Perovskite Ceramic $(Ca_{0.5}Sr_{0.5})(Mn_{0.5}Fe_{0.5})O_{3-\delta}$**
C. Kaps, M. Heidenreich; Bauhaus-University Weimar, Germany

9:15 - 9:30
S4-026 **Influence of Flue Gas Components on the Chemical Properties of the Ceramic Materials (Co-) $Ce_{0.8}Gd_{0.2-x}Pr_xO_{2-\delta}$**
J. Schneider[1], C. Semmler[1], C. Kaps[1], F. Schulze-Küppers[2], S. Baumann[2], W. A. Meulenberg[2]; [1]Bauhaus University Weimar, Germany, [2]Institute of Energy Research 1, Germany

9:30 - 9:45
S4-027 **SNDM Observation of Al-doped ZnO Ceramics Using Nanocomposite Particles Prepared by Mechanical Treatment**
S. Tasaki[1], J. Tatami[2], S. Kirihara[1]; [1]Osaka University, Japan, [2]Yokohama National University, Japan

9:45 - 10:00
S4-028 **Modification of Electrical Properties of Zinc Oxide by Continuous-Wave Ytterbium Fiber Laser Irradiation**
H. Kido[1], M. Takahashi[1], J. Tani[1], N. Abe[2], M. Tsukamoto[2]; [1]Osaka Municipal Technical Research Institute, Japan, [2]Osaka University, Japan

10:00 - 10:15
S4-029 **A Simple and "Green" Method for Synthesis of Nanocomposite Magnetic Particles**
Z. Swiatkowska-Warkocka, K. Kawaguchi, H. Wang, Y. Katou, N. Koshizaki; Institute of Advanced Industrial Science and Technology, Japan

10:15 - 10:30
S4-030 **Preparation of $LaSi_3N_5:Eu^{2+}$ Phosphor Powders by Combustion Synthesis**
Y. Zhou[1], Y. Yoshizawa[1], K. Hirao[1], Z. Lenčéš[2], P. Šajgalík[2]; [1]National Institute of Advanced Industrial Science and Technology, Japan, [2]Slovak Academy of Sciences, Slovakia

10:30 - 10:45 **Break**

10:45 - 12:00: Green and Smart Powder Processing

Chairs: Oleg Khasanov (Tomsk Polytechnic University, Russia) and
Naoki Kondo (National Institute of Advanced Industrial Science and Technology, Japan)

10:45 - 11:15
S4-031 **Luminescence of ZnO Blue Phosphor Heavy Doped MgO by Flux Reaction (Invited)**
K. Inoue[1], S. Hashimoto[2], Y. Iwamoto[2]; [1]Mie Industrial Research Institute, Japan, [2]Nagoya Institute of Technology, Japan

11:15 - 11:30
S4-032 **Methods of Friction Forces Control at Dry Powders Shape Forming**
O. Khasanov, E. Dvilis; Nano-Centre of Tomsk Polytechnic University, Russia

11:30 - 11:45
S4-033 **Rheological Behavior of Nanosized Silica Suspensions**
T. Zmigrodzki[1], A. Danelska[1], M. Leonowicz[1], Y. Sakka[2], M. Szafran[1]; [1]Warsaw University of Technology, Poland, [2]National Institute for Materials Science, Japan

11:45 - 12:00
S4-034 **Fabrication of Amorphous Alumina Particles Using the Atmospheric Non-equilibrium Plasma with the Nanosecond Pulsed Power Supply**
S. Endo[1], T. Nakayama[1], W. Jiang[1], T. Suzuki[1], H. Suematsu[1], Z. Fu[2], S. W. Lee[3], K. Niihara[1]; [1]Nagaoka University of Technology, Japan, [2]Wuhan University of Technology, China, [3]Sun Moon University, Korea

13:15 - 15:00: Green Processing for Nitride Ceramics

Chairs: Kiyoshi Hirao (National Institute of Advanced Industrial Science and Technology, Japan) and
Weiwu Chen (Osaka University, Japan)

13:15 - 13:45
S4-035 **Porous Silicon Nitride and Sialon Prepared by Reaction Sintering Method (Invited)**
H.-D. Kim; Korea Institute of Materials Science, Korea

13:45 - 14:00
S4-036 **Nitridation Behaviors of Silicon Powder Doped with Various Rare Earth Oxides**
H. Hyuga, Y. Zhou, H. Kita, K. Hirao; National Institute of Advanced Industrial Science and Technology, Japan

14:00 - 14:15
S4-037 **Formation and Densification of SiAlON Materials by Reaction Bonding and Silicothermal Reduction Routes**
Y. Rouquié, M. Jones; University of Auckland, New Zealand

14:15 - 14:30
S4-038 **Fabrication of Sintered Reaction Bonded Silicon Nitrides from Low-cost Si Powder**
D. Kusano[1], S. Adachi[1], G. Tanabe[1], H. Hyuga[2], Y. Zhou[2], K. Hirao[1,2]; [1]Japan Fine Ceramic Company Ltd., Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

14:30 - 14:45
S4-039 **Improvement in Dielectric Properties of Highly Thermal-Conductive Silicon Nitrides**
H. Miyazaki, Y. Yoshizawa, K. Hirao; National Institute of Advanced Industrial Science and Technology, Japan

14:45 - 15:00
S4-040 **Preparation and Properties of AlN Ceramic Bonded Carbon**
W. Chen[1], Y. Miyamoto[1,2], T. Matsumoto[1,2], T. Tojo[1,2]; [1]Osaka University, Japan, [2]Toyo Tanso. Co., Ltd., Japan

15:15 - 16:30: Green Processing for Powder Syntheses

Chairs: Mark Jones (University of Auckland, New Zealand) and
Kiyoshi Hirao (National Institute of Advanced Industrial Science and Technology, Japan)

15:15 - 15:30
S4-041 **Preparation of β-$Si_{6-z}Al_zO_zN_{8-z}$ (z = 1-3) by Combustion Synthesis**
X. Yi, K. Watanabe, T. Akiyama; Hokkaido University, Japan

15:30 - 15:45
S4-042 **Synthesis of Monolithic β–Sialon Powders ($Si_{6-z}Al_zO_zN_{8-z}$, Z =2-4) through Controlling the Combustion Reaction Temperature**
M. Shahien[1], M. Radwan[2], S. Kirihara[2], Y. Miyamoto[2], T. Sakurai[3]; [1]Central Metallurgical Research and Development Institute, Egypt, [2]Osaka University, Osaka, Japan, [3]ISMAN J Corporation, Think Miraikobo, Japan

15:45 - 16:00
S4-043 **Synthesis and Characterization of $BaTiO_3$ - $BaAl_2O_4$ Composite by Self-Propagating High-Temperature Synthesis Method**
S. Niyomwas, T. Sathaporn, S. Singsarothai; Prince of Songkla University, Thailand

16:00 - 16:15
S4-044 **Combustion Mode of Self-propagating High-temperature Synthesis of Ti_2AlC**
N. Nishina[1], S. Hashimoto[1], K. Hirao[2], Y. Zhou[2], H. Hyuga[2], S. Honda[1], Y. Iwamoto[1]; [1]Nagoya Institute of Technology, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

16:15 - 16:30
S4-045 **Synthesis of Eu-Doped β-SiAlON Phosphors Using Microwave Heating**
M. Hirota[1], Y. Zhou[2], Y. Yoshizawa[2], K. Hirao[2]; [1]College of Industrial Technology, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

Symposium 4

Poster Session

Tuesday, November 16

Room: Event Hall

12:00 - 14:00

S4-P001 **Fabrication of B_4C from $Na_2B_4O_7$+Mg+C by SHS Method**
J. Guojian[1], X. Jiayue[1], Z. Hanrui[2], L. Wenlan[2]; [1]Shanghai Institute of Technology, China, [2]Chinese Academy of Sciences, China

S4-P002 **Formation of Carbide Ceramics by Carbothermal Reduction of Silica using a Microwave Heating Technique**
S. Ohashi[1], S. Hashimoto[1], S. Honda[1], Y. Iwamoto[1], K. Hirao[1,2], H. Hyuga[2]; [1]Nagoya Institute of Technology, Japan, [2]National Institute of Advanced Industrial Science and Technology, Japan

S4-P003 **Preparation of $MgSiN_2$ Phosphors by Combustion Synthesis**
D. Wakimoto[1,2], S. Hashimoto[1], Y. Iwamoto[1], Y. Zhou[2], K. Hirao[2]; [1]Nagoya Institute of Technology, Japan, [2]National Institute of Advanced Industrial Science & Technology, Japan

S4-P004 **Texture Development in Fe-doped Alumina Ceramics via Templated Grain Growth**
Y. Çelik, E. Suvacı; Anadolu University, Turkey

S4-P005 **Development of Silicon Nitride Based Composites Having a High Repeated Thermal Shock Resistance**
H. Hyuga[1], N. Kondo[1], H. Kita[1], Y. Izutsu[2], H. Kajino[2]; [1]National Institute of Advanced Industrial Science and Technology, Japan, [2]Mitsui Mining & Smelting Co., Ltd., Japan

S4-P006 **Fabrication of Metal Hydride Alloys Using Autonomous Metal Hydride Actuator for Seawater Exchange in Hakodate Port**
K. Minato[1], M. Miyatake[1], S. Honmura[1], K. Matsumura[2], T. Masuda[3], Y. Goto[1], S. Asanuma[1]; [1]Hakodate National College of Technology, Japan, [2]Hokkaido Industrial Technology Center, Japan, [3]Ministry of Land, Infrastructure, Transport and Tourism, Japan

S4-P007 **Formation of New Alumina by Shearing at High Pressure**
H. Furuichi; Furuichi Laboratory, Japan