Electric Field Enhanced Processing of Advanced Materials III: Complexities and Opportunities

Tomar, Portugal
19-24 March 2023

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Engineering Conferences International
32 Broadway, Suite 314
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USA

Phone: (212) 514-6760
Fax: (212) 514-6030

info@engconfintl.org

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Monday, March 20, 2023

07:30 – 08:30	Breakfast
	Session I: Overview Presentations
PLEASE NOTE	***Please note that talks are limited to <30 min (including 5 – 10 minutes for questions) to make room for a 90 min. round table discussion at the end.***
08:30 – 09:00	**The History of Flash Sintering** Marco Cologna, European Commission, Joint Research Centre (JRC), Germany
09:00– 09:30	**Reactive Flash Sintering** 1 Luis A. Perez-Maqueda, Spanish National Research Council - University of Seville, Spain
09:30 – 10:00	Coffee Break
10:00 – 10:30	**Athermally Enhanced High Temperature Plastic Flow in Zirconia Ceramics under Flash Event** 2 Hidehiro Yoshida, The University of Tokyo, Japan
10:30 – 11:00	**From Electrical Current via Non-Equilibrium n to Frenkel Defects** 3 Dietrich E. Wolf, University of Duisburg-Essen, Germany
11:00 – 11:30	Coffee Break
11:30 – 12:00	**Importance of in-situ Experiments in Understanding External Field Effects during Flash Sintering** 4 Shikhar Krishn Jha, IIT Kanpur,India
12:00 – 12:30	**From Pit Fire to Ultrafast High-Temperature Sintering (UHS): Shared Features of Ultra-Fast Sintering Techniques** 5 Salvatore Grasso, Queen Mary University of London, United Kingdom
13:00 – 14:30	Lunch
14:30 – 15: 00	**Electrical Transitions/Memristors** Tony West, Sheffield University, United Kingdom
15:00 – 15:30	**Ultra-Fast High Temperature Sintering (UHS) of Strontium Titanate** 6 Martin Bram, Forschungszentrum Juelich GmbH, Germany
15:30 – 16:00	Coffee Break
16:00 – 16:30	**Confluence of Flash and UHS** Rishi Raj, University of Colorado-Boulder, USA
16:30 – 17:00	Coffee Break
17:00 – 18:30	**Round Table Discussion (all speakers)**
19:30 – 21:00	Dinner
21:00 – 23:00	**Posters and Social Hour**

Tuesday, March 21, 2023

07:30 – 08:30	Breakfast	
	Session 2: Reactive Flash Sintering	
08:30 – 08:50	**Manufacturing** David Pearmain, Lucideon Ltd, United Kingdom	
08:50 –09:10	**Reactive Flash Sintering of High Entropy ($Mn_{0.2}Co_{0.2}Ni_{0.2}Cu_{0.2}X_{0.2}$)$Fe_2O_4$ (X=Fe, Mg) Spinel Oxides** Pedro Sanchez Jimenez, Institute of Materials Science of Seville - CSIC, Spain	7
09:10 – 09:30	**Effects of Reactive Flash Sintering on Phase Evolution of Ceramic Materials** Lílian M. Jesus, UFSCar, Brazil	8
09:30 – 10:00	Coffee Break	
	Session 3: In-Operando Characterization	
10:00 – 10:20	**Structural Changes Induced by Flash in a Single Crystal of Pr_2CuO_4** Dmitry Reznik, University of Colorado-Boulder, USA	9
10:20 – 10:40	**Flash Migration Velocity in Bilayers: With an Without Interdiffusion** Rishi Raj, University of Colorado-Boulder, USA	
10:40 – 11:00	**Studies of Grain Boundaries by High Resolution TEM** Klaus van Benthem, University of California Davis	
11:00 – 11:30	Coffee Break	
	Session 4: SPS/Microwave/UHS	
11:30 – 11:50	**Effect of Microstructural Refinement on Electrical Properties of BST-Based Ceramics Prepared by Spark Plasma Sintering and Spark Plasma Texturing** Camila Ribeiro, CICECO - University of Aveiro, Portugal	10
11:50 – 12:10	**Ultrafast High-Temperature Sintering of Advanced Ceramics: A Direct Comparison with the State-of-the-Art Techniques** Salvatore Grasso, Queen Mary University of London, United Kingdom	11
13:00 – 14:30	Lunch	
14:30 – 14:50	**Evaluating the Microwave Sintering Behaviors of Binder-jetted Additively Manufactured Alumina** Bashu Aman, Carnegie Mellon University, USA	12
	Session 5: Special Materials Systems	
14:50– 15:10	**Microstructure and Defect Formation in $BaTiO_3$ Ceramics Obtained by Flash Sintering of Micro and Nanopowders** Samuel López Blanco, Universitat Politècnica de Catalunya, Spain	13
16:00 – 16:20	**Flash Sintering of Gadolinium-doped Ceria** Luca Balice, Forschungszentrum Jülich GmbH, Germany	14
16:20 – 17:00	Coffee Break	

Tuesday, March 21, 2023 (continued)

17:00 – 17:20	**Field Assisted Sintering Techniques in Recycling NdFeB Magnets** Monica Keszler, Forschungszentrum Jülich GmbH, Germany	15
17:20 – 17:40	**Effect of Absorbed Power on Densification and Grain Growth during Rapid Microwave Sintering** Kirill I. Rybakov, Institute of Applied Physics, Russian Academy of Sciences, Russia	16
17:40 – 18:10	**Investigation of the Mechanisms of Flash Sintering in Ceramic Materials** Thomas Tsakalakos, Rutgers University, USA	17
19:30 – 21:00	Dinner	
21:00 – 23:00	**Posters and Social Hour**	

Wednesday, March 22, 2023

07:00 – 08:30	Breakfast	
	Session 5: Special Materials Systems (continued)	
08:30 – 08:50	**Flash Assisted Processing of Entropy Stabilized (Mg, Co, Ni, Cu, Zn)O** Mohammad Imteyaz Ahmad, Indian Institute of Technology (BHU), India	18
08:50 – 09:10	**Investigation and Enhancement in Properties of Copper Converter Slag Residue with Flash Sintering Method** Zeynep Çetinkaya, Konya Technical University, Turkey	19
09:10 – 09:30	**Flash Sinter-Crystallization: A New Technique for Ultrafast Crystallization of Glasses** João Vitor Campos, Universidade Federal de São Carlos, Brazil	20
09:30 – 10:10	Coffee Break	
10:10 – 10:30	**Behind the High Electrical Performance of Flash Sintered Potassium Sodium Niobate Piezoelectric Ceramics** Alexander Tkach, University of Aveiro, CICECO-Aveiro Institute of Materials, Portugal	21
10:30 – 10:50	**Preliminary Results of Flash Sinter-Crystallization of $Li_{1.3}Al_{0.3}Ti_{0.7}(PO_4)_3$ for All Solid-State Batteries** Ana Candida Rodrigues, Federal University of São Carlos, Brazil	22
10:50 – 11:10	**Influence of Fields on Grain Boundary Mobility in Alumina** Rachel Marder, Technion – Israel Institute of Technology, Israel	23
11:10 – 11:20	**In-situ Generation and Grain Growth of Ceo2 Nanocrystals in AC/DC Electrical Fields** Vaclav Tyrpekl, Charles University, Czech Republic	24
12:15 – 13:30	Lunch	
13:50	Excursion: Meet in hotel lobby	
14:00	Depart with guides on excursion	
18:00	Return from excursion	
18:30	Social hour in Lobby Bar	
19:30 – 21:00	Dinner	
21:00 – 23:00	Social Hour	

Thursday, March 23, 2023

07:30 – 08:30	Breakfast	
	Session 6: Metals	
08:30 – 08:50	**Laser Powder Bed Fusion of Cemented Carbide Geometries Using Tungsten Carbide-Nickel Agglomerated Powder** Alexander Gourley, Carnegie Mellon University, USA	25
08:50 – 09:10	**MXeene-Based Ceramic Nanocomposites Enabled by Field-Assisted Sintering** Maxim Sokol, Tel Aviv University, Israel	26
09:10 – 09:40	Coffee Break	
09:40 – 10:00	**Nanocarbon-Infused Copper Conductors by Electric Field Assisted Processing** Uthamalingam Balachandran, University of Colorado-Boulder, USA	27
10:00 – 10:20	**Energy Deficit and Defect Formation** Jean-Marie Lebrun, St. Gobain, France	
10:20 – 11:20	**OPEN DISCUSSION: Defects: Calorimetry, Characterization, Phonons**	
13:00 – 14:30	Lunch	
	Session 7: Defects and Theory/Experiments	
14:30 – 14:50	**Memristors: The Role of Anode Interface Resistance** Rishi Raj, University of Colorado-Boulder, USA	
14:50 – 15:10	**Neural Network-Based Simulation Method to Examine Ion Behaviors Under Electric Fields: Application to Ion Migration in Amorphous Li_3PO_4** Koji Shimizu, The University of Tokyo, Japan	28
15:10 – 15:30	**Probing the local structure of electroluminescing rutile TiO2 with neutron diffuse scattering and atomistic modelling** Ty Sterling, University of Colorado-Boulder, USA	29
15:30 – 15:50	**Role of Native Defects in Field-Assisted Sintering** Yoed Tsur, Technion - Israel Institute of Technology, Israel	30
16:00 – 16:30	Coffee Break	
16:30 – 16:50	**First-Principles Design and Discovery of New High-Entropy Materials** Liping Yu, University of Maine, USA	31
16:50 – 17:10	**Flash Sintering as a Route to Produce Lead-Free Piezoelectric KNN** Ana Senos, University of Aveiro, Portugal	32
17:10 – 17:30	**Understanding Flash Sintering of Semiconductor Oxide Materials at the Nano- Atomic Scale** Fátima Zorro, Instituto Superior Técnico, Portugal	33
17:30 – 18:45	Posters Session	
18:45 – 20:00	Social hour with piano	
20:00 – 22:00	Conference Gala Dinner	

Friday, March 24, 2023

07:30 – 08:30	Breakfast	
	Session 8: Advanced Methods	
08:30 – 08:50	**Touch Free Sintering with Superposition of Magnetic Fields** Rishi Raj, University of Colorado-Boulder, USA	
08:50 – 09:10	**Multi-Phase Flash Sintering: The Next Natural Step in Flash Sintering Evolution** Sandra Molina-Molina, Spanish National Research Council (CSIC), Spain	34
09:10 – 09:30	**Rapid Densification of Technical Ceramic Coatings using a Precise Controlled Contactless Flash Sintering System** Carolyn Grimley, Lucideon, USA	35
09:30 – 09:50	**Flash Sintering, a Novel Technique, for Manufacturing Surrogate and Active Nuclear Materials** Gareth Jones, Lucideon Ltd, United Kingdom	36
09:50 – 10:30	Coffee Break	
10:30 – 10:50	**Generating Electrically Conducting Single Crystals of Rutile Titania Through Repetitive Flash Experiments** Devinder Yadav, Indian Institute of Technology Patna, Bihta, India	37
10:50 – 11:30	**OPEN DISCUSSION: The Future?**	
13:00 – 14:30	Lunch and Departures	

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