

2018 Program Review of Aerospace Materials for Extreme Environments

Dr. Ali Sayir | May 14-18, 2018 | Niceville, FL

DAY 1 – 14 MAY 2018

8:00-9:00 **REGISTRATION**

9:00-9:40 Aerospace Materials Program - Q & A

A. Sayir

POSTER SESSION: 2018 NEW STARTS (10 Min Poster Presentations)

10:00-12:00	(2018 YIP) Directionally-Solidified Spiral Eutectics: Towards Chiral Materials by Design	Ashwin J. Shahani MICHIGAN
	(2018 YIP) Nanoscale Pyroelectric Hybrid Materials with Structural Phase Transition	Jian Shi RPI
	(EOARD) Electrocaloric Response of Stress-free Relaxor Ferroelectrics by Experimental and Analytical Techniques	Ebru M. Alkoy GEBZE
	Ceramic Nanolaminates for Electromagnetic Shielding: Understanding the RF Response of MXene-based Heterostructures	Joshua Kennedy, Dhriti Nepal, Ruth Pachter, and Richard Vaia AFRL
	Locally Extracted Globally Organized Microstructure Models using Markov Random Fields	Veera Sundararaghavan MICHIGAN
	Scientific Understanding of Interfaces	Huseyin Sehitoglu UIUC
	Optical Ceramics Science for High-Power Lasers	Romain Gaume UCF
	PT-Symmetric Programmable Materials	Sahin K. Ozdemir, Melik Demirel PSU
	Defect Equilibration Studies in Binary Metal-oxides	Shriram Ramanathan PURDUE
	The strain-stress Relationships for Band Gap, Phonon and Plasmon Energies in Monoclinic Ga ₂ O ₃ and Related Materials	Matthias Schubert U. NEBRASKA -LINCOLN
	Fundamental Mechanisms and Control of Dielectric Breakdown in Electronic Materials	Len Brillson OSU
	Fabrication, Processing and Characterization of Contacts to Ga ₂ O ₃ with Enhanced Thermal Stability	Ramana V Chintalapalle & Lisa Porter - UTEP & CMU
	Nanoscale Probing of Magneto-electric Phases	Edwin Fohtung NEW MEXICO STATE
	Computational and Asymptotic Modeling of Electromagnetic Heat Exchangers	Burt Tilley WPI
12:00-12:30	LUNCH	
12:30-13:00	(2017 MURI MURI INTRODUCTION) Cross-Disciplinary Electronic-Ionic Research Enabling Biologically Realistic Autonomous Learning (CEREBRAL)	W. Alan Doolittle GEORGIA INST. OF TECHN.
13:00-13:30	Machine-Learning Approach Towards Quantitative Structure-Property Relationships for Metallic Interfaces	Srikanth Patala NCSSU
13:30-14:00	Mechanisms of Surface Chemical and Electrochemical Stability on Perovskites	Bilge Yildiz MIT
14:00-17:00	POSTER DISCUSSIONS	

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DAY 2 – 15 MAY 2018

LASER HOST MATERIALS & COOLING

8:00-9:00	Chalcogenides for Mid-IR Lasers (Mirov) - Cr-, and Fe Doped Chalcogenide (Camata) - Theoretical Model (Kawai)	S. Mirov, R. Camata, R. Kawai and V. Fedorov U. ALABAMA
9:00-9:30	High Quantum Efficiency and High Purity Rare Earth Doped Crystal for Solid State Cooling: Synthesis and Characterization	M. Sheik-Bahae UNM
9:30-10:00	Green Processing Transparent Ceramics	R. Speyer GIT
10:00-10:30	BREAK	
10:30-11:00	Fundamental Studies of Heavy Metal Oxide Glasses for High Power Lasers	K. Lipinska UNM
11:00-11:30	Feasibility and Mechanisms of Chemical Reactions as a Basis for Heat Transfer Media	B. Lear PSU
11:30-12:00	(2015 YIP) Toward Bio-Inspired Smart Thermal Spreaders	H. Ghasemi U. HOUSTON
12:00-12:30	Phase-change on Nanoporous Graphene for Advanced Thermal Management	E. Wang MIT
12:30-13:00	LUNCH	

HYPERSONIC

13:00-13:30	Mechanical Properties and Creep Deformation and Durability of Ultra High Temperature Ceramics	M. Ruggles-Wrenn AFIT
13:30-14:00	(EOARD) High Temperature Composites using Microwave Enhanced Chemical Vapor Infiltration	J. Binner BIRMINGHAM
14:00-14:30	High Temperature Melt Infusion through B ₄ C	V. Kumar and A. Bronson UTEP
14:30-15:00	BREAK	
15:00-15:30	Design and Assessment of Multifunctional Coatings for Ablation and Emissivity Performance	R. Trice PURDUE
15:30-16:00	Electromagnetic and Thermal Design of Optimal Common Aperture Materials with Ceramics and Composites	J. Park, A. Urbas, I. Ternovskiy AFRL
16:00-16:30	Experiments and Modeling of the Thermo-Mechanical Properties of Micro-Architecture Tungsten Coatings	J. El-Awady JOHNS HOPKINS
16:30-17:00	Continuum-Equivalent Traction Fields: Quantitative Descriptors of Nanoscale Interfaces	H. B. Chew UIUC

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DAY 3 – 16 MAY 2018

MATERIALS FAR FROM EQUILIBRIUM AND SYNTHESIS SCIENCE

8:00-8:30	In Situ Studies of Thermal, Chemical and Mechanical Stabilities of Refractory Materials	S. Kodambaka UCLA
8:30-9:00	Scalable, Solution-Phase Routes Towards Metal Carbides	J. Goldberger OSU
9:00-9:30	(PECASE) Soft Chemical Approaches to the Synthesis of Metastable Materials,	D. Freedman NORTHWESTERN
9:30-10:00	BREAK	
10:00-10:30	Coupled Stress-Induced Evolution of Nanoscale Materials Interfaces	A. Martini UC MERCED
10:30-11:00	(EOARD) Stochastic Models for Cold Sprayed Microstructures	F. Willott ECOLE DES MINES
11:00-11:30	Development of Non-Equilibrium Materials with Extraordinary Electronic Properties	D. Vashaee NCSU
11:30-12:00	High-Temperature Interfacial Thermodynamics and Control of HT Ceramic GB with Electric Field	J. Luo UCSD
12:00-12:30	LUNCH	
12:30-13:00	(2016 YIP) Far from Equilibrium Structures and Processes	B. R. Jayan CMU
13:00-13:30	(2015 YIP) Electronic Structure Basis for Solubility and Phase Stability in Metals	M. Ghazisaeidi OSU
13:30-14:00	Density Functional Theory Studies of Hydrogen/Nitrogen Super-Saturation Mechanisms in Transition Metals and Metal Hydrides/Nitrides	J. Wilcox COLORADO SCHOOL OF MINES
14:00-14:30	Dissolution, Supersaturation and Crystallization Enabling the Cold Sintering	C. Randall PSU
14:30-15:00	BREAK	
15:00-15:30	Toward a Phenomenological Theory of Transport Phenomena in Molten Sulfide system	A. Allanore MIT
15:30-16:00	Prediction of Diffusionless Phase Transformations in Complex Materials: Applications to Transformation Plasticity	Randall Hay AFRL
16:00-16:30	From Atom Probe Tomography Imaging to Microstructural Quantification: An Iterative Optimization Approach	E. Marquis & W. Windl U. MICHIGAN / OSU
16:30-17:00	The Local Structure and Chemistry in Marginal Glass Forming Alloys	Eren Kalay ODTU

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DAY 4 – 17 MAY 2018

MATERIALS FAR FROM EQUILIBRIUM

8:00-9:00	Controlled nanostructures of atomically thin 2D oxides (Sehirlioglu) - Electronic Structure & Point Defects (Lambert) - Nanostructural Investigation (Berger) - Transport Effects (Gao)	Alp Sehirlioglu, W. Lambrecht and X. Gao - CWRU M. H. Berger, ECOLE DES MINES –PARIS
9:00-10:00	Extreme Nonlinearity in Transition Metal Oxides	A. Demkov and J. Ekerdt, UT DALLAS
10:00-10:30	BREAK	
10:30-11:00	Cathode Materials for Electron Emission	T. Back AFRL
11:00-11:30	(EOARD) Broadband Reflective Surfaces for Infrared Radiation	K. Sendur SABANCI
11:30-12:00	Theoretical Investigation of Quantum Thermal and Electric Transport Properties	T. Haugan AFRL
12:00-13:00	LUNCH	
13:00-13:30	Millimeter Wave Interactions with High Temperature Materials	B. Hoff AFRL
13:30-14:00	Multiscale Methods in Beamed Energy Harnessing Applications	B. S. Tilley WPI
14:00-14:30	Nonreciprocal Metal-Dielectric Photonic Structures for Electromagnetic Isolation	A. Chabanov UT SAN ANTONIO
14:30-15:00	BREAK	

MICROSTRUCTURAL RESPONSE TO EXTERNAL FIELDS

15:00-16:00	Nonlinear Terahertz Studies of Electro-Optic and Magneto-Electric Materials (Khodaparast) - Multiferroic Materials (Priya) - Non-Linear Ultrafast Field Imaging (Raschke) - Theory of Non-Linear Effects (Beyanin & Stanton)	G. Khodaparast, S. Priya, M. B. Raschke, A. Beyanin and C. Stanton VIRGINIA TECH / COLORADO/ FLORIDA
16:00-16:30	High-Throughput Experimentally and Computationally Guided Discovery of Next Generation HT Shape Memory Alloys	J. Vlassak and R. Arroyave HARVARD U. & TEXAS A&M
16:30-17:00	Elucidating Actuation-Induced Failure Mechanisms in High Temperature Shape Memory Alloy	I. Karaman TEXAS A&M

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DAY 5 – 18 MAY 2018

MICROSTRUCTURAL RESPONSE TO EXTERNAL FIELDS

8:00-8:30	(EOARD) Crystalline Films using Electrochemical Atomic Layer Deposition	R. M. Modibedi CNR
8:30-9:00	(EOARD) TiPt-Based HTSMA for Actuator Applications at 1000C	S. Chikosha CNR
9:00-9:30	(EOARD) Growth mechanism and planar defect formation in β -(Al _x Ga _{1-x}) ₂ O ₃ /Ga ₂ O ₃ heterostructures grown by MOVPE on differently oriented β -Ga ₂ O ₃ bulk Crystals	G. Wagner IKZ
9:30-10:00	Beta-Gallium Oxide	J. Speck and S. Ringel UCSB / OSU
10:00-10:30	Studies of the Properties of Bulk and Thin Film β -Ga ₂ O ₃ Materials	S. Badescu, D. Thomson, S. Ganguli AFRL
10:30-11:00	BREAK	
11:00-11:30	Linear and Nonlinear Spectroscopic Studies of Linear and Nonlinear Dielectrics and Interfaces	S. Greenbaum and Y. Ren HUNTER COLLEGE NY
11:30-13:30	<p>The Role of Interfaces in Performance, Degradation, and Breakdown of Non-Linear Dielectrics (Randall)</p> <ul style="list-style-type: none"> - Structural Point Defect Characterization (Dickey) - Phase Field Prediction of Dielectric Breakdown (Chen) - Predictive science of Point Defects (Irving) - Electronic Modification of Electrode Interfaces (Klein) 	C. Randall, P. Hopkins, B. Dickey D. Irving, L.-Q.- Chen, and A. Klein PSU / UVA / NCSU DARMSTADT
13:30-14:00	LUNCH	
14:00-16:30	ONE TO ONE MEETINGS	