

2017 Aerospace Materials for Extreme Environments Program Review

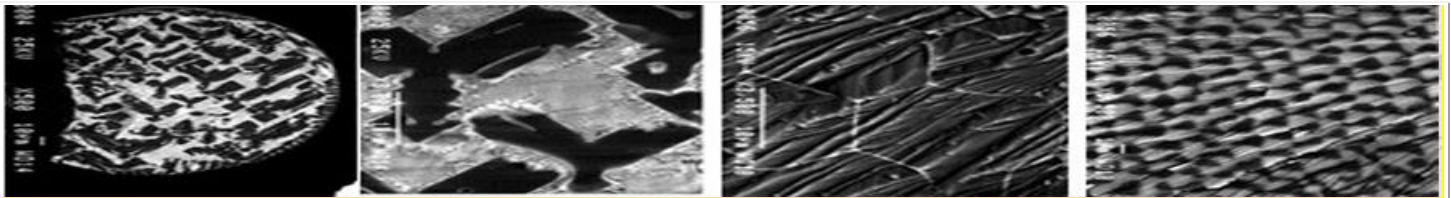
Dr. Ali Sayir | May 15-19, 2017 | KAFB, NM

DAY 1 – 15 MAY 2017

8:30-9:00	Future Directions of Aerospace Materials Portfolio	A. Sayir
COMPUTATIONAL MATERIAL SCIENCE:		
9:00-10:00 (40+20)	(MURI) MOSAIC OF MICROSTRUCTURE Markov Random Fields: A Pervasive Method for Generating 3D Microstructures from 2D Image Data	M. DeGraef V. Sundararaghavan CMU / MICHIGAN / PURDUE
10:00-10:30 (20+10)	Rare Event Simulation for Modeling of Low-Probability Events in Materials Systems	M. Comer PURDUE
10:30-11:00	BREAK	
10:00-11:30 (20+10)	Stochastic Models for Cold Sprayed Microstructures	F. Willott ECOLE DES MINES
11:30-12:00 (20+10)	Continuum-Equivalent Traction Fields: Quantitative Descriptors of Nanoscale Interfaces	H. B. Chew UIUC
12:00-12:30 (20+10)	Experiments and Modeling of the Thermo-Mechanical Properties of Micro-Architected Tungsten Coatings	J. El-Awady JOHNS HOPKINS
12:30-13:30	LUNCH	
13:30-14:10 (30+10)	High-Throughput Experimentally and Computationally Guided Discovery of Next Generation HT Shape Memory Alloys	J. Vlassak and R. Arroyave HARVARD U. & TEXAS A&M
14:10-14:30 (15+5)	Synthesis of Crystalline Thin Films using Electrochemical Atomic Layer Deposition	R. M. Modibedi CNR
14:30-14:50 (15+5)	Development of TiPt-Based HTSMA for Actuator Applications at 1000C	S. Chikosha CNR
14:50-15:10 (15+5)	The local Structure and Chemistry in Marginal Glass Forming Alloys	E. Kalay ODTU
15:10-15:30	BREAK	
15:30-18:00	2016 / 2017 NEW STARTS & POSTER SESSION	Time
(2015 YIP) Electronic Structure Basis for Solubility and Phase Stability in Metals	M. Ghazisaeidi / OSU	10
(2016 YIP) A Machine Learning Approach Towards Quantitative Structure	S. Patala / NCSU	10
(2016 YIP) Far from Equilibrium Structures and Processes	R. Rajan / CMU	10
Fundamental Studies of Heavy Metal Oxide Glasses for High Power Lasers	K. Lipinska / UNM	10
Theoretical Investigation of Quantum Thermal and Electric Transport Properties	T. Haugan / AFRL	10
Mechanisms of Surface Chemical and Electrochemical Stability on Perovskites	B. Yildiz / MIT	10
Radio-Frequency Cathode with Ferrite Core for Use in Space Propulsion	M. Celik / BOGAZICI	10
(2016 DURIP) Enhanced Test Facility for Survivability	J. Dennison / UST	10
(2016 DURIP) Field-induced Chemical and Microstructure Evolution	E. Dickey and D. Vashae NCSU	10
(2016 DURIP) UV to mid-IR Nonlinear Spectroscopy for Characterizing Defects	Y. Ren and S. Greenbaum HUNTER COLLEGE NY	10

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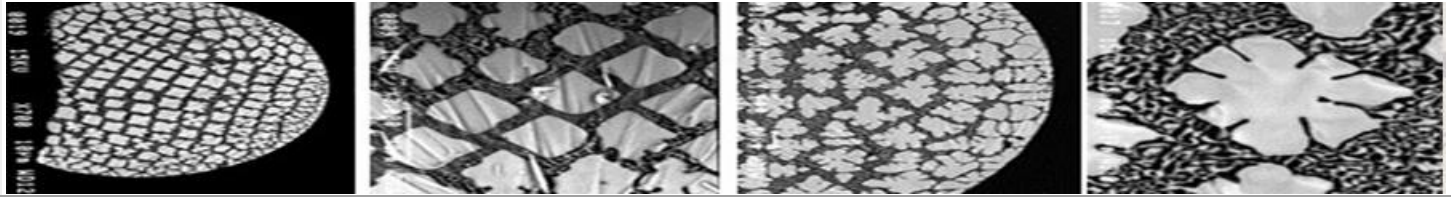
DAY 2 – 16 MAY 2017

MATERIAL COUPLING WITH EXTERNAL FIELDS I:

8:30-9:30 (40+20)	<p>(MURI) Template-Directed Directionally Solidified Eutectic Metamaterials (Braun)</p> <ul style="list-style-type: none"> - Theory of Losses in polyphaser Structures (Fan) - 3D Modeling of Solidification (Thornton) - Film Deposition (Martin) 	<p>P. Braun, S. Fan K. Thornton, and L. Martin UIUC / HARVARD / MCHIGAN / STANFORD</p>
9:30-10:00 (20+10)	Quantum-Engineered Semiconductor Metamaterials for Giant Non-Reciprocity without Magnetic Effects	A. Alu UT AUSTIN
10:00-10:30 (20+10)	Broadband Reflective Surfaces for Infrared Radiation	K. Sendur SABANCI
10:30-11:00	BREAK	
11:00-11:40 (30+10)	From Atom Probe Tomography Imaging to Microstructural Quantification: An Iterative Optimization Approach	E. Marquis & W. Windl U. MICHIGAN / OSU
11:40-12:10 (20+10)	(2013 YIP) A Transformational Approach to Quantify Chemistry at the Atomic Scale	J. LeBeau NCSU
12:10-13:30	LUNCH	
13:30-14:00 (20+10)	Atomic-Scale Modeling of Equilibrium and Transport Properties at Metal-Dielectric Interfaces	W. Windl OSU
14:00-16:00 (90+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) - Development of Perovskite Single Crystals (Lee) - Electronic Modification of Electrode Interfaces (Klein) 	<p>C. Randall, P. Hopkins, B. Dickey D. Irving, L.-Q.- Chen, H.Y. Lee, and A. Klein PSU / UVA / NCSU DARMSTADT SUNMOON</p>
16:00-16:30 (20+10)	Linear and Nonlinear Spectroscopic Studies of Linear and Nonlinear Dielectrics and Interfaces	S. Greenbaum and Y. Ren HUNTER COLLEGE NY
16:30-17:00 (20+10)	Coupled Stress-Induced Evolution of Nanoscale Materials Interfaces	A. Martini UC MERCED

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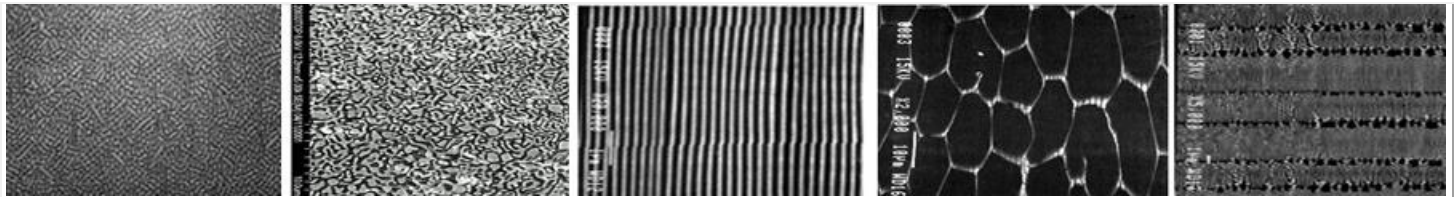
DAY 3 – 17 MAY 2017

MATERIAL COUPLING WITH EXTERNAL FIELDS II:

8:30-10:00 (70+20)	<p>Charge Transfer at Metal Dielectric Interfaces (Ekerdt)</p> <ul style="list-style-type: none"> - Physics of Heterostructure (Demkov) - Electron Holography (McCarthy & Smith) - Electrical Characterization (Wallace & Young) 	<p>J. Ekerdt and A. Demkov, M. McCartney, C. Young and D. Smith UT AUSTIN/ ASU / UT DALLAS</p>
10:00-10:30	BREAK	
10:30-12:10 (80+20)	<p>Nonlinear Terahertz Studies of Electro-Optic and Magneto-Electric Materials (Khodaparast)</p> <ul style="list-style-type: none"> - Multiferroic Materials (Priya) - Non-Linear Ultrafast Field Imaging (Raschke) - Theory of Non-Linear Effects (Belyanin & Stanton) 	<p>G. Khodaparast, S. Priya, M. B. Raschke, A. Belyanin and C. Stanton VIRGINIA TECH / COLORADO/ FLORIDA</p>
12:10-13:30	LUNCH	
13:30-14:00 (20+10)	Nanoscale probing of Magnetoelectric Phases using Coherent X-ray Photons and Neutrons	E. Fohtung NM STATE
14:00-15:30 (80+20)	<p>Quantitative Identification of Electro-Physical Properties of Hetero-Interfaces at Extreme Environments (Sehrioglu)</p> <ul style="list-style-type: none"> - Electronic Structure & Point Defects (Lambert) - Nanostructural Investigation (Berger) - Transport Effects (Gao) 	<p>A. Sehrioglu, W. Lambrecht M. H. Berger, and X. Gao CWRU / ECOLE DES MINES –PARIS</p>
15:30-15:40	BREAK	
15:40-16:10 (20+10)	Studies of the Properties of Bulk and Thin Film β -Ga ₂ O ₃ Materials	D. Thomson, S Badescu AFRL
16:10-16:40 (20+10)	Beta-Gallium Oxide	J. Speck and S. Ringel UCSB / OSU

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DAY 4 – 18 MAY 2017

MATERIALS FOR HYPERSONICS|:

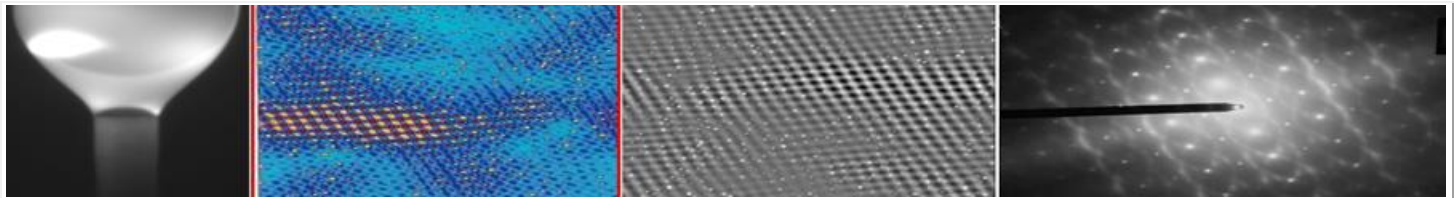
8:30-9:00 (20+10)	Fracture Toughness of Ultra-High Temperature Ceramics	B. Fahrenholtz & M. AsleZaeem MISSOURI S & T
9:00-9:30 (20+10)	Mechanical Properties and Creep Deformation and Durability of Ultra High Temperature Ceramics	M. Ruggles-Wrenn AFIT
9:30-10:00 (20+10)	High Temperature Composites using Microwave Enhanced Chemical Vapor Infiltration	J. Binner BIRMINGHAM
10:00-10:30	BREAK	
10:30-11:00 (20+10)	(YIP) Understanding the stability and Microstructure of the Zeta Phase in Transition Metal Carbides and Nitrides	C. Weinberger DREXEL
11:00-11:30 (20+10)	Influence of Group IV& V Alloying Elements on the Microstructure Engineering and Deformation in TaC	G. Thompson U. ALABAMA
11:30-12:00 (20+10)	Scalable, Solution-Phase Routes Towards Metal Carbides	J. Goldberger OSU
12:00-12:30 (20+10)	In Situ Studies of Thermal, Chemical and Mechanical Stabilities of Refractory Materials	S. Kodambaka UCLA
12:30-13:30	LUNCH	

SYNTHESIS SCIENCE:

13:30-14:00 (20+10)	Design and Assessment of Multifunctional Coatings for Ablation and Emissivity Performance	R. Trice PURDUE
14:00-14:30 (20+10)	High-Temperature Interfacial Thermodynamics and Control of HT Ceramic GB with Electric Field	J. Luo UCSD
14:30-15:00 (20+10)	(PECASE) Soft Chemical Approaches to the Synthesis of Metastable Materials,	D. Freedman NORTHWESTERN
15:00-15:30	BREAK	
15:30-16:00 (20+10)	Toward a Phenomenological Theory of Transport Phenomena in Molten Sulfide system	A. Allanore MIT
16:00-16:30 (20+10)	Prediction of Diffusionless Phase Transformations in Complex Materials: Applications to Transformation Plasticity	Randall Hay AFRL
16:30-17:00 (20+10)	High Temperature Phase Transformations in the Rare Earth Titanate System	T. Kriven UIUC

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DAY 5 – 19 MAY 2017

MATERIALS FOR DIRECTED ENERGY:

8:30-9:30 (40+20)	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
9:30-10:00 (20+10)	High Quantum Efficiency and High Purity Rare Earth Doped Crystal for Solid State Cooling: Synthesis and Characterization	M. Sheik-Bahae UNM
10:00-10:30	BREAK	
10:30-11:00 (20+10)	Feasibility and Mechanisms of Chemical Reactions as a Basis for Heat Transfer Media	B. Lear PSU
11:00-11:30 (20+10)	(2015 YIP) Toward Bio-Inspired Smart Thermal Spreaders	H. Ghasemi U. HOUSTON
11:30-12:00 (20+10)	Phase-change on Nanoporous Graphene for Advanced Thermal Management	E. Wang MIT
12:00-13:00	LUNCH	
13:00-13:30 (20+10)	Electromagnetic and Thermal Design of Optimal Common Aperture Materials with Ceramics and Composites	J. Park AFRL
13:30-14:00 (20+10)	Nonreciprocal Metal-Dielectric Photonic Structures for Electromagnetic Isolation	A. Chabanov UT SAN ANTONIO
14:00-14:30 (20+10)	Cathode Materials for Electron Emission	T. Back AFRL
14:30-14:50	BREAK	
14:50-15:20 (20+10)	Millimeter Wave Interactions with High Temperature Materials	B. Hoff AFRL
15:20-15:50 (20+10)	Multiscale Methods in Beamed Energy Harnessing Applications	B. S. Tilley WPI
15:50-16:20 (20+10)	Development of Non-Equilibrium Materials with Extraordinary Electronic Properties	D. Vashaee NCSU
16:20-16:50 (20+10)	Elucidating Actuation-Induced Failure Mechanisms in High Temperature Shape Memory Alloy	I. Karaman TEXAS A&M