

2019 Materials Science Graduate Student Symposium

The University of Alabama

Ferguson Student Center

Thursday, January 24th 2019

8:30 – 9:15 am Registration – Foyer in front of **Ferguson Student Center Ballroom**

8:30 – 10:00 am poster set up - **Ferguson Student Center Ballroom Room**

9:15 – 9:30 am Welcoming remarks - **Ferguson Student Center Ballroom Room**

Oral Presentations

Session I – Magnetic Materials Ferguson Student Center Room 3108

Session chair: Prof. C. Mewes

- 9:30 – 9:45 S. Budhathoki
The magnetic spin textures in FeGe thin films
- 9:45 – 10:00 Ashok Pokhrel
Dzyaloshinskii-Moriya Interaction in Ultrathin Films and Multilayer Structure for Domain Wall Skyrmions
- 10:00 – 10:15 Minyeong Choi
Computational Materials Science: Electronic Structure of Nanocrystalline Soft Magnetic Materials
- 10:15 – 10:30 Anish Rai
Broadband FMR measurements on MnN/CoFeB exchange biased systems
- 10:30-10:45 Shuang Wu
Thickness Dependence of Magnetization Dynamics of (FeCo)-Si Alloy Thin Films

Session II – Advanced Manufacturing Materials Ferguson Student Center Room 3104

Session chair: Prof. L. Brewer

- 9:30 – 9:45 Behzad Bahrami Babamiri
Finite element failure analysis of additively manufactured lattice structure
- 9:45 – 10:00 Jared Stone
A Transient Thermal Model for Predicting Thermal Gradients in Additive Manufacturing Using the Finite Difference Method
- 10:00 – 10:15 T. Liu
Measurement of Residual Strain in High Pressure Die Cast A383 Engine Blocks Using Neutron Diffraction

10:15 – 10:30 Myles Fullen
Exploring variability in the microstructural response and mechanical properties of heat treated blown powder Inconel 625

10:30 – 10:45 Jordan Terrell
Quantifying bimetallic joints formed using direct metal deposition processes for an additive manufactured rocket engine component

10:45 – 11:00 BREAK

Session II continued
Ferguson Student Center Room 3104

Session chair: Prof. J Schneider

11:00 – 11:15 Charles Cook
Modeling of a Hyperbaric-Pressure Laser Chemical Vapor Deposition

11:15 – 11:30 Benjamin Lund
Evaluation of the Orthogonal Metal Cutting Process for Characterizing the Microstructural Evolution in Friction Stir Welding

11:30 – 11:45 Joseph Indeck
Volumetric Fatigue Crack Quantification of α -Iron

11:45 – 12:00 Rachel White
Transmission Kikuchi Diffraction of the Thermally Grown Oxide on Grain-refined NiAl-Zr

Session III – Energy materials

Session chair: S. Kim

11:00 – 11:15 Zhongliang Ouyang
Design of segmented high-performance thermoelectric generators with cost in consideration

11:15 – 11:30 Zhongqi Liu
Insight into the Synergism of CeO₂/NR Supported M-Co Bimetallic Oxides (M=Fe, Ni, Cu) for CO Oxidation Reaction

11:30 – 11:45 Rajagopalan V. Ranganathan
Plasma-Catalysis Chemical Looping CH₄ reforming with water splitting using ceria supported Ni based La-perovskite nano-catalyst

11:45 – 12:00 Zhuoran Gan
Investigation of Pt-Zn Intermetallic Nanocatalysts for Oxidative Dehydrogenation of Ethane

12:00 – 12:15 Liping Guo
Tunable Quasi-One-Dimensional Ribbon Enhanced Light Absorption in Sb₂Se₃ Thin-Film Solar Cells Grown by Close-Space Sublimation

12:00 – 1:15 LUNCH (multiple vendors in the Ferguson Center)
Judges, please meet in the Anderson Room (RM 3125 in the Ferguson Student Center)

Session IV – Material Chemistry
Ferguson Student Center Room 3108

Session chair: Prof. D. Li

- 1:15 – 1:30 Atolo Tuinukuafe
Challenges and Value in Atom Probe Tomography of Cementitious Materials
- 1:30 – 1:45 Rina Adhikari
Incorporating thermally stable ligands into hierarchically porous carbon
- 1:45 – 2:00 Hector Sanchez-Moran
Oxime cross-linked alginate hydrogel threads with tunable stress relaxation

Session V - Bio/organic materials
Ferguson Student Center Room 3108

Session chair: Prof. Amirghamnia

- 2:00 – 2:15 Pinaki S. Nakod
Three-dimensional hyaluronic acid hydrogels to investigate glioblastoma stem cell behaviors
- 2:15 – 2:30 Akshay A. Narkhede
Impact of quinic acid and tannic acid surface functionalization on the uptake of ultrasmall iron oxide nanoparticles by cancer cells
- 2:30 – 2:45 Unnati Patel
Rapid Diagnostics of Mycobacteria with Lectin Conjugated Silica Coated Magnetic Nanoparticles

Session VI – Nanomaterials
Ferguson Student Center Room 3104

Session chair: A. Hauser

- 1:15 – 1:30 Keshab Bashyal
Study of the Potential Energy Landscape of the different Grain Boundary phases of Cu-Zr Nanocrystalline Alloy
- 1:30 – 1:45 Xiao Han
Chemical composition tunes the nanoscale heterogeneity in metallic glass thin films
- 1:45 – 2:00 Yang Hu
Organic Additives in Deposition of Cobalt for Advanced Interconnects
- 2:00 – 2:15 K.M. Law
Epitaxial Al films for superconducting resonators

- 2:15 – 2:30 Corey Patton
Gallium-Based Liquid Metal Alloys for Use in Stretchable Electronics and Soft Robotics
- 2:30 – 2:45 Xiaozhou Yu
Improve the Stability of Organic-Inorganic Hybrid Perovskite by Atomic Layer Deposition

Session closes

- 2:45 – 3:00 Judges conference – Anderson Room
- 3:00 – 3:15 Presentation of winners and prizes and concluding remarks - Ferguson Student Center Heritage Room
- 3:15 Symposium adjourned

Poster Presentations **Ferguson Student Center Ballroom**

Judging and presentation times (students, please be by your poster at the times below):

10:15 – 12:00

Material Chemistry
Nanomaterials
Bio/organic materials
Energy Materials

1:15 – 2:45

Advanced Manufacturing Materials
Magnetic materials

Magnetic Materials

1. Farhad Akbari Afkhami
Influence of preparation method on the morphology of magnetic CuCr₂Se₄ nanoparticles
2. S. KC
Structural, Magnetic and Mechanical Properties of Co_{2-x}Ti_xFeGe (0 ≤ x ≤ 1) Alloy Series
3. Zhong Li
Vectorial observation of the spin Seebeck effect in epitaxial NiFe₂O₄ thin films with varying magnetic anisotropy
4. R. Mahat
Tuning structural, magnetic and mechanical properties by vanadium substitution in Fe₃Ge
5. Bhuwan Nepal
Low Temperature Broadband Ferromagnetic Resonance measurements on NiFe/Cu/IrMn/CoFe exchange biased system
6. Sudhir Regmi
Growth of spinel ferrite NiFe₂O₄ on lattice matched substrates

7. Alicia Wadsworth
The Influence of Composition on Chemical Partitioning and Partial Crystallization Behavior in CoFeMnSiBNb Soft Magnetic Materials

Advanced Manufacturing Materials

8. David Attig
In-Situ 3-D metal printing using locally sourced material
9. D.Z. Avery
Microstructural and Mechanical Behavior of High-Shear Solid-State Deposition of Rare Earth Magnesium Alloy WE43
10. Dallin J. Barton
Laser Assisted Cold Spray of Ferritic Alloys
11. Robert Escobar Jr
Meshfree Simulation of Oxide Dispersion in MELD of Aluminum Alloys
12. Laura Farris
Microstructure Evolution of Additively Manufactured Inconel 718
13. M. O. Miller
The As-Deposited Properties of Ti64 by High Shear Solid State Deposition
14. Zachary Myers
Utilizing Ultrasonic Thermometry in Friction Stir Welding
15. Noah Naden
Effect of low temperature heat treatments on the resulting microstructure of blown powder deposition, additive manufacturing Inconel 625 specimens
16. Brandon Phillips
Process Parameter Microstructure Relationship for Solid State Additive Manufactured Aluminum Alloy 6061
17. B.A. Rutherford
Fatigue and Fracture of Solid-state Additive Manufacturing of Aluminum alloy 6061
18. Justin Rife
Mechanical Properties and Microstructure of Carbon Fibers Deposited from Ethylene via Hyperbaric Chemical Vapor Deposition
19. B.E. Tucker
Capturing the Effect Of Temperature And Strain Rate On the Plasticity of Solid State Additive Manufactured Inconel 625
20. Swinson Terry
 Σ Forge: Low-Cost Open Source Prototyping and Research Platform
21. B.C. White
The plastic strain and subsequent fatigue response of AA7050 friction stir welds
22. N. Zhu
Connecting Residual Stresses with Friction Stir Welding Conditions and Pseudo-heat Index
23. Oz Agar
Corrosion Behavior of Aluminum Alloy AA7075 Cold Sprayed Coatings

Energy materials

24. Muntaseer Bunian
Effects of TiO₂ in Low Temperature Propylene Epoxidation Using Gold Catalysts
25. Junhao Li
CO oxidation over CeO₂ supported Ru nanoclusters: support shape and Ru valence state effects
26. Angelique Montgomery
Solution-Processed Copper (I) Thiocyanate (CuSCN) for Highly Efficient CdSe/CdTe Thin Film Solar Cells
27. James Rogers
Iodine Plasma Erosion of Hollow Cathode Materials
28. Maanas Togaru
Coating Core-shell Cermets for Nuclear Thermal Propulsion Fuel Protection
29. Bernabe S. Tucker
Influence of Process Parameters on Plasma Surface Modification
30. Yifan Wang
Influence of γ -Al₂O₃ addition on oxygen adsorption in CeO₂ nanorods supported Rh catalyst
31. Yanxiao Ma
Au@Pt Nanoparticles on Transparent Electrodes for Spectroelectrochemistry Study of Methanol and Formic Acid Oxidation

Material Chemistry

32. Chunxu Chen
Separating single wall carbon nanotubes : length separation and single chirality isolation
33. Brett Hunter
Oxidation Behavior of Refractory Complex Concentrated Alloys: Computational and Experimental Studies
34. Timothy Ross Totsch
Synthesis, characterization and applications of highly modular polyphosphonates
35. Xingjian Wang
The Application of Gibbs Phase Rule and Critical Point Universality to Predict Critical effects in Solid-Liquid Phase Equilibria

Bio/organic materials

36. Pravin Dimble
3-Dimensional Bio-printing of Composite GelMA/PCL Scaffolds
37. Unnati Patel
Rapid Diagnostics of Mycobacteria with Lectin Conjugated Silica Coated Magnetic Nanoparticles
38. Kavini Rathnayake
Functionalized Hollow Mesoporous Silica Nanoparticles as an Efficient Carrier of Antibiotics
39. Bahrum Prang Rocky
Investigation of the crystallinity index (CI) and crystallite sizes of four bamboo species using X-ray diffraction (XRD) technique

Nanomaterials

40. Sourav Garg
Growth and Electrical, Nano-Optical Characterization of semiconducting MoS₂/WS₂ in-plane Heterostructures
41. David Jacobson
Pinning Strength Quantification of Solute Concentrations at Specific Grain Boundaries
42. Roni Paul
Comparison of electrical properties of PLZT thin film capacitors using coplanar and interplanar electrode configuration
43. Thomas Koenig
Thermomechanical Testing of Free-Standing Thin Films: A Novel Experimental Technique
44. Bhavesh Ramkorun
Literature Review of the effects of DC Bias in the nucleation of BN thin films in Chemical Vapor Deposition (CVD)
45. Hang Song
Using ImageJ to analyze SEM micrographs of Nano/microscale fibers
46. S. Ranjit
Substrate Deformation from Aerosol Deposition of Barium Hexaferrite Film