Research Opportunity
(with Assistantship for Qualified Students)

- Research Projects on Additive Manufacturing (aka 3-D Printing) of Metallic Alloys
- Microstructure Analysis
- Parametric Investigation on Controlling the Microstructure
- Opportunity leading to Graduate Research Assistantship (M.S. and/or Ph.D.)
SOHN Materials Research Group
http://mse.ucf.edu/sohn/

Gas Atomization Metallic Powder Processing for Powder Bed Fusion Agile and Additive Manufacturing

Low-Enriched Metallic Nuclear Fuels for Research Reactors and Non-Proliferation

Gas Turbine Components and Thermal Barrier Coatings

Neutron Irradiation Enhanced Atomic Diffusion under Temperature Gradient for Advanced Metallic Nuclear Fuels @ INL Adv. Test Reactor

Metallic Alloys and Multiscale Composites: Magnesium and Aluminum for Automotive and GCVs Tungsten for Kinetic Energy

Multifunctional and Multicomponent alloys: High Entropy; Thermoelectric; Magnetocaloric; Bulk Metallic Glasses; Biomaterials
Advanced, Agile Additive Manufacturing for Metallic Alloys

Selective Laser Melting

Gas Atomization
Research Flow Chart for Advanced Agile Additive Manufacturing (A3M) for Metallic Alloys at University of Central Florida

Application Requirements

Alloy Design by Materials Science and Engineering Fundamentals

Primary Powder Processing via Gas Atomization

Army Research Laboratory
- W911NF-17-2-0172

US Office of Naval Research
- ONR N00014-17-1-2559

Aerojet Rocketdyne

Component Specific Alloys and Manufacturing Parameters

Predicted Targets

Design and Mod. Strategies

Properties and Durability Assessment
Additive Manufacturing for Metallic Alloys: Capability and Research of Sohn’s Group

- **Feedstock Alloy Powders Processing**
  - Alloy design (partnership with several universities and national laboratories)
  - UCF Gas atomization facility

- **Powder Bed Fusion Technology**
  - Selective Laser Melting (SLM) 125HL
  - Microstructural analysis and control via SLM parameters
  - Nano-indentation for mechanical behavior assessment
  - ASTM mechanical testing and other functional behavior

- **Interdisciplinary Collaboration**
  - Computational fluid dynamics modeling of gas atomization
  - Computational fluid dynamics and phase-field modeling of solidification/welding
  - Scanning strategy (rate, scheme, etc) by controls
Additive Manufacturing for Metallic Alloys: Materials Science and Engineering Challenges

https://acamm.llnl.gov/models/powder-model
Requirements for Undergraduate Research Experience

- Excellent academic credentials: Are you responsible?
- Desire to understand science and engineering beyond textbooks
- Problem solver, not just identifier
- Accomplisher of tasks, objectives and goals regardless of time of the day
Benefits of Undergraduate Research Experience

- Real-world link to your textbook knowledge
- Stipend (and even tuition) as UG, definitely for graduate education
- Goal-oriented, personalized internship based on your skills (i.e., outside of UCF)
- Professional/personal network
Unfair advantage on your resume for either industrial or academic career
- Archived presentations and journal publications
- Sponsored project completion and accomplishments

Hands-on, unique skillsets
- e.g., Electron microscopy
- e.g., Additive manufacturing (e.g., Magics™)

Reference (recommendation letter) for your career