

Research Opportunity (with Assistantship for Qualified Students)

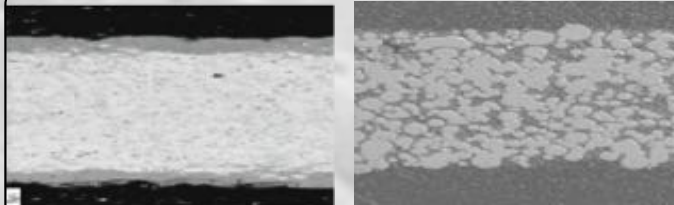
- Research Projects on **Additive Manufacturing** (aka 3-D Printing) of **Metallic Alloys**
- **Microstructure Analysis**
- **Parametric Investigation on Controlling the Microstructure**
- **Opportunity leading to Graduate Research Assistantship (M.S. and/or Ph.D.)**



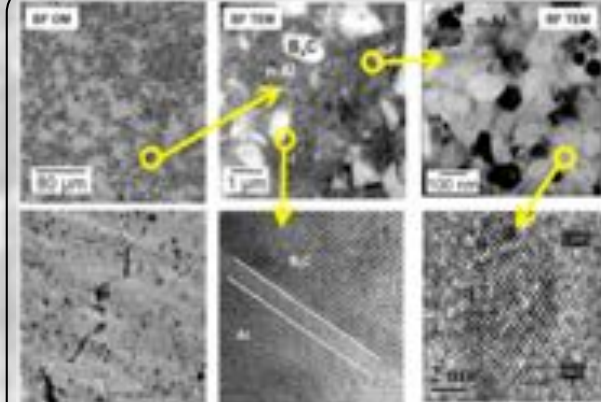
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SOHN Materials Research Group
<http://mse.ucf.edu/sohn/>

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

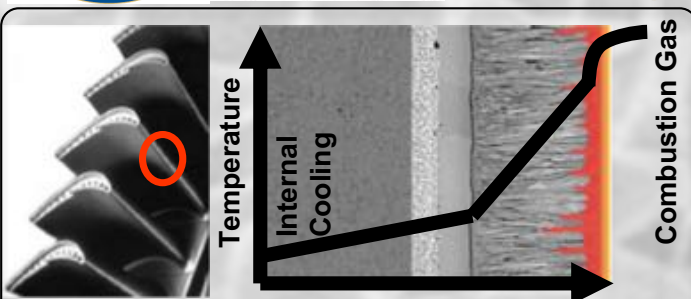


Low-Enriched Metallic Nuclear Fuels for Research Reactors and Non-Proliferation

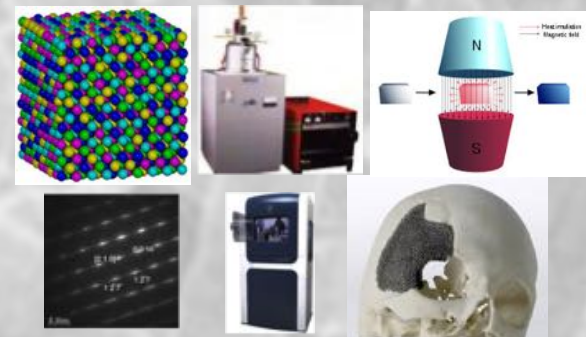


Metallic Alloys and Multiscale Composites:
Magnesium and Aluminum for Automotive and GCVs
Tungsten for Kinetic Energy

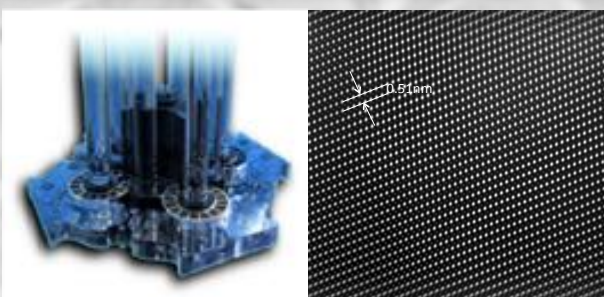
High Throughput Development of Thermodynamics and Diffusion Kinetics Database for Materials by Design



Gas Turbine Components and Thermal Barrier Coatings



Multifunctional and Multicomponent alloys:
High Entropy; Thermoelectric; Magnetocaloric; Bulk Metallic Glasses; Biomaterials

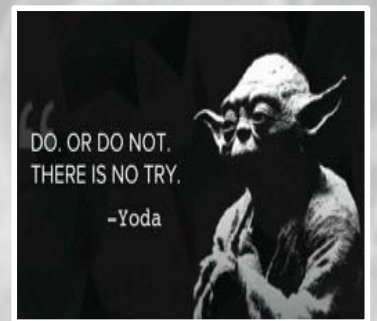
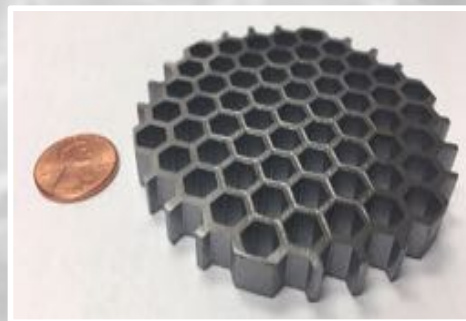
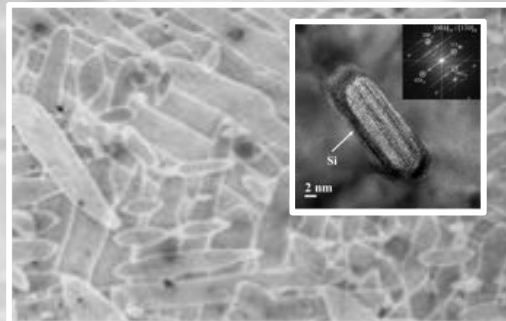
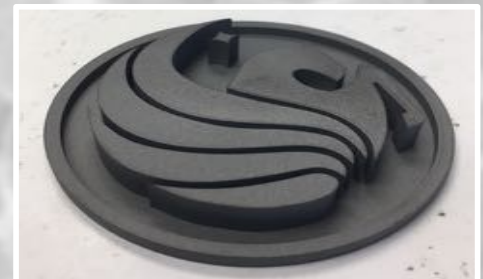
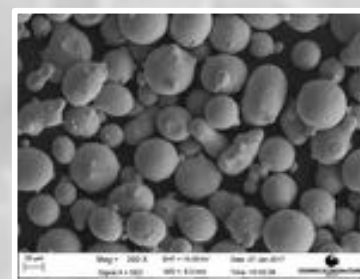
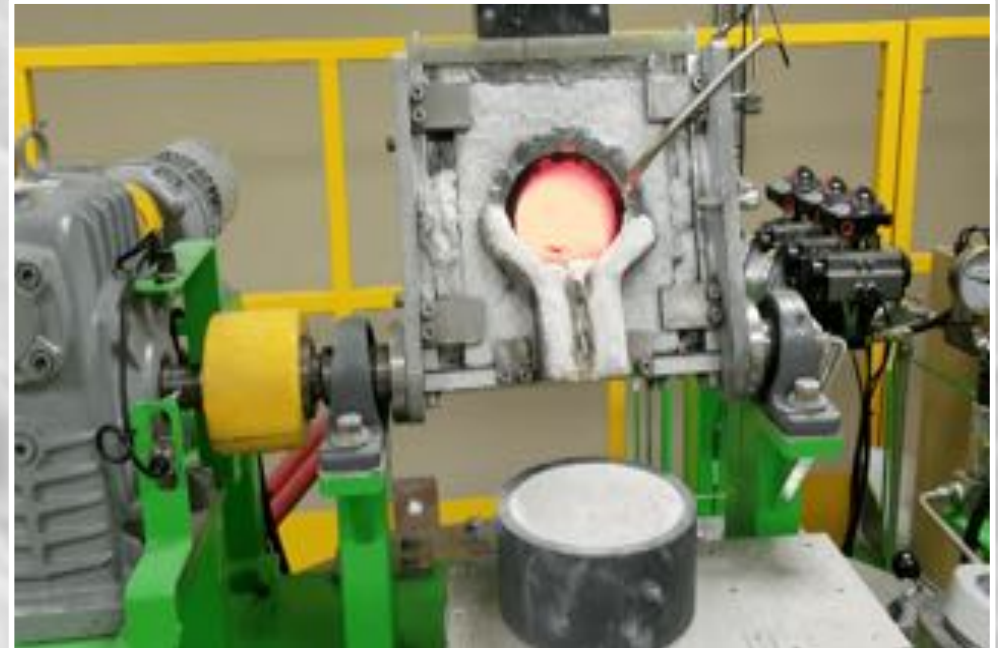


Neutron Irradiation Enhanced Atomic Diffusion under Temperature Gradient for Advanced Metallic Nuclear Fuels @ INL Adv. Test Reactor

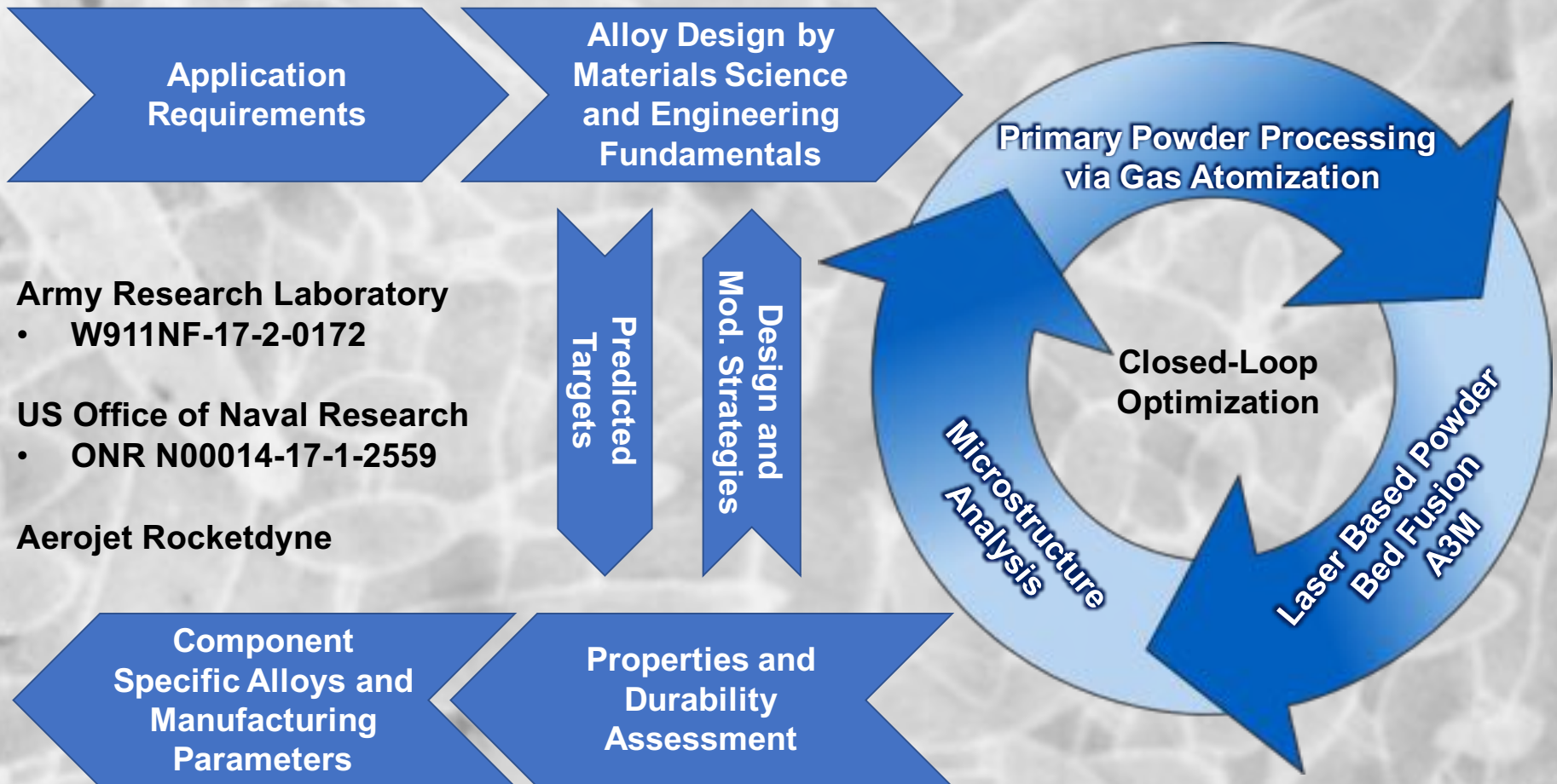


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Advanced, Agile Additive Manufacturing for Metallic Alloys



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



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

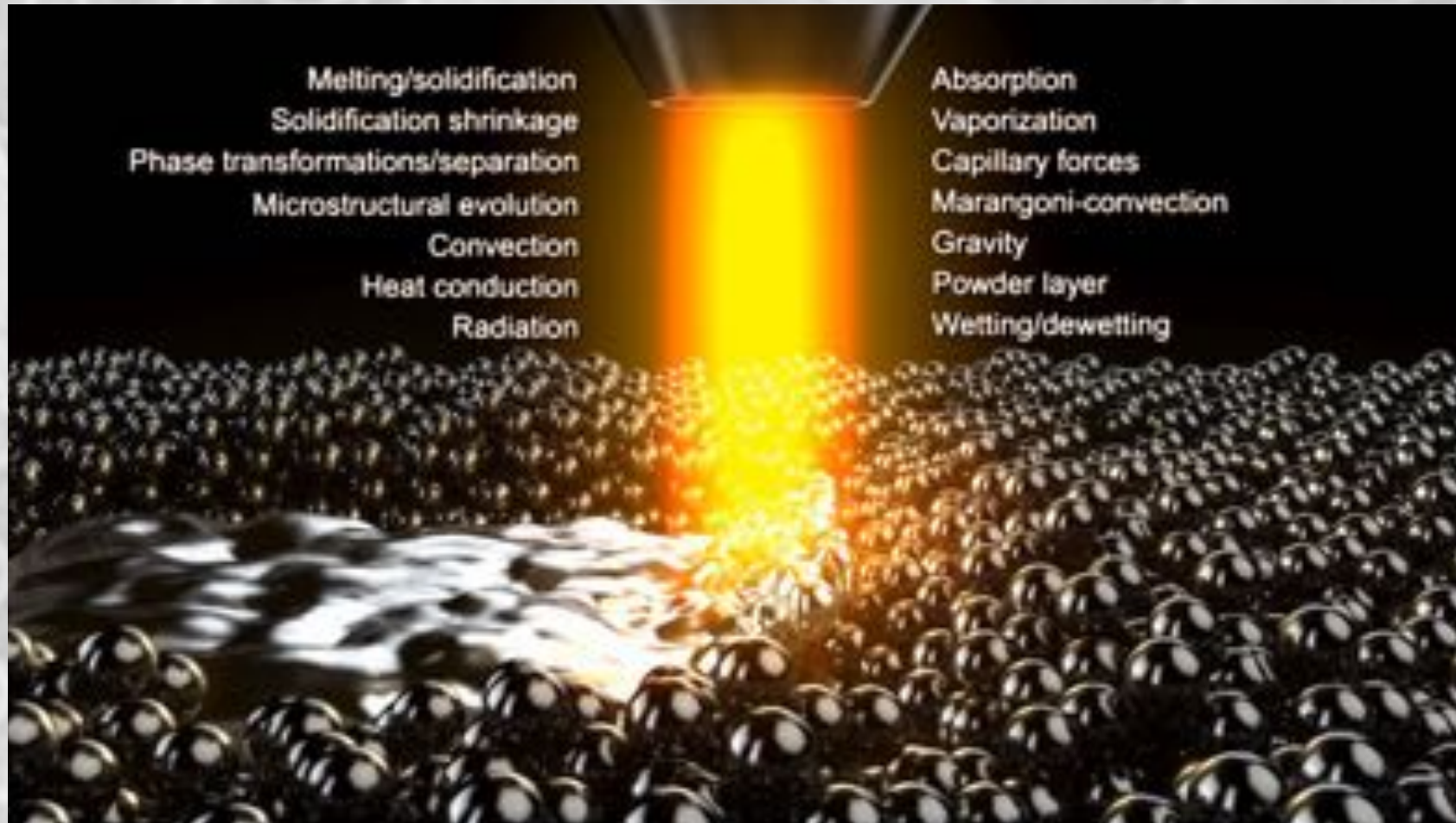
- **Powder Bed Fusion Technology**

- ☞ 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**

Undergraduate Research Outcomes

- **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**