

Justin Mayer

Graduate Student in Materials, UC Santa Barbara

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Education

UC Santa Barbara, Santa Barbara, CA

2019–Present

Graduate Student, Materials Department, University of California, Santa Barbara

Advisors: Professor Ram Seshadri and Professor Tresa M. Pollock

Northeastern University, Boston, MA

2014–2018

Bachelor of Science, Degree in Chemical Engineering & Physics; Minor in Mathematics

Research Summary

My research focuses on controlling the microstructure of biphasic intermetallic material systems. I study the influence of strain gradients on the magnetic properties of magnetic nanoprecipitates embedded in a nonmagnetic matrix phase. I characterize these composite materials through SQUID magnetometry, x-ray diffraction, and transmission electron microscopy. Experimental work, such as post processing heat treatments, are often guided by first principle density functional theory calculations that I perform.

Professional Experience

HRL Laboratories, Malibu, CA

Materials Researcher

January 2019–August 2019

- Applied the grain refinement technology from initial co-op to additional unweldable alloy systems
- Designed and characterized a novel solid-state device for sourcing and sinking alkali vapor
- Developed Matlab scripts to analyze x-ray computed tomography measurements of a ceramic composite

Undergraduate Co-op

May 2016–December 2016

- Performed electroless Ni-P plating for thermal barrier coating of piston crowns
- Studied the potential to refine grain structure of 3D printed aluminum alloys
- Filed invention disclosure on a novel precursor material to be used in future welding processes

Dipartimento di Fisica, Università degli Studi di Milano, Milan, Italy

Research Assistant

July 2017–December 2017

- Prepared gold nanoparticles embedded in amorphous silicon through DC magnetron sputtering
- Characterized amorphous silicon grown on gold nanoparticles *via* X-ray Photoelectron Spectroscopy

Mefford Magnetic & Nanostructured Materials Research Group, Clemson, SC

Research Assistant

May 2015–July 2015

- Studied the binding properties of different polymer end groups to the surface of nanoparticles
- Quantified ligand exchange activity of iron oxide nanoparticles with liquid scintillation counting

Teaching

Northeastern University

Physics I and Physics II Peer Tutor; Founder of Physics II peer tutoring program

Undergraduate teaching assistant for Chemical Engineering Thermodynamics I

Publications

6. C. Lenardi, **J. Mayer**, G. Faraone, J. Cardoso, S. Marom, R. Modi, A. Podestá, S. Kadkhodazadeh, and M. Di Vece, Nanoscale induced formation of silicide around gold nanoparticles encapsulated in a-Si, *Langmuir* **36** (2020) 939–947. [[doi](#)]
5. J. Cardoso, S. Marom, **J. Mayer**, R. Modi, A. Podestá, X. Xie, M. A. van Huis, and M. Di Vece, Germanium Quantum Dot Grätzel-Type Solar Cell, *Phys. Status Solidi A*, **215** (2018) 1800570. [[doi](#)]
4. J. H. Martin, B. D. Yahata, E. C. Clough, **J. A. Mayer**, J. M. Hundley, and T. A. Schaedler, Additive manufacturing of metal matrix composites via nanofunctionalization, *MRS Commun.* **8** (2018) 297–302. [[doi](#)]
3. K. Davis, M. Vidmar, A. Khasanov, B. Cole, M. Ghelardini, **J. Mayer**, C. Kitchens, A. Nath, B. Powell, and O. T. Mefford, The effect of post-synthesis aging on ligand exchange activity of iron oxide nanoparticles, *J. Colloid Interface Sci.* **511** (2018) 374–382. [[doi](#)]
2. J. H. Martin, B. D. Yahata, E. C. Clough, R. D. Mone, **J. A. Mayer**, E. Stonkevitch, R. C. Schubert, J. A. Miller, J. M. Hundley, T. A. Schaedler, and T. M. Pollock, Recent advances in additive manufacturing of high strength 7000 series aluminum, *Adv. Mater. Processes* **176** (2018) 18–22. [[doi](#)]
1. J. H. Martin, B. D. Yahata, J. M. Hundley, **J. A. Mayer**, T. A. Schaedler, and T. M. Pollock, 3D printing of high-strength aluminium alloys, *Nature* **549** (2017) 365–369. [[doi](#)]

Patents

U.S. Application No. 15/880,452, Nanoparticle composite welding filler materials, and methods for producing the same; B. Yahata, *J. Mayer*, and J. H. Martin. Filed February 2017. Patent Pending.

Presentations

National:

J. Mayer, S. Cranford, (2015, August). Computationally optimizing fullerenols as specific non-covalent drug carriers: discriminating H-bond anchoring, van der Waals adhesion and electrostatic interactions. Oral presentation at the American Chemical Society conference, Boston, MA.

Regional:

J. Mayer, E. Levin, Y. Eggeler, L. Kautzsch, K. Gates, D. Gianola, T. M. Pollock, and R. Seshadri, (2020, January) Engineering interfacial strain gradients in biphasic half-Heusler composites. Poster presentation at Materials Research Outreach Program, Santa Barbara, CA.

J. Mayer, B. Yahata, J. H. Marting, (2016, December). Implementation of grain refiners within additively manufactured high strength aluminum alloys. Oral presentation at HRL Laboratories, Malibu, CA.

J. Mayer, K. Davis, O. T. Mefford, (2015, June), The effect of aging surfaces on ligand exchange. Poster presentation at Clemson University's interfaces and surfaces research experience for undergraduates, Clemson University, Clemson, SC.

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