

Justin Mayer

Ph.D. Candidate in Materials, UC Santa Barbara

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Education

UC Santa Barbara, Santa Barbara, CA

2019–Present

Ph.D. Candidate, 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 examines the relationships between atomic order, microstructure, and magnetism. I am particularly interested in applying multiscale modeling to outstanding problems in magnetism and plasticity. I perform atomistic calculations *via* density functional theory to inform phase field calculations at the mesoscopic level. I am also particularly interested in code development. Specifically, I aid in the modification and maintenance of the phase field dislocation dynamics software of Professor Irene J. Beyerlein's research group.

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

12. B. E. Rhodes, **J. A. Mayer**, Y. M. Eggeler, S. Xu, J. D. Lamb, J. Wendorf, M. P. Echlin, J. Li, T. M. Pollock, R. Seshadri, I. J. Beyerlein, and D. S. Gianola, Deformation mechanisms and defect structures in Heusler intermetallics, *In preparation*.
11. **J. A. Mayer**, K. V. Vamsi, R. Seshadri, and T. M. Pollock, Antiphase boundaries within *B2* intermetallics: proximate structures, formation energies, and chemical stability, *In preparation*.
10. **J. A. Mayer** and Ram Seshadri, Electron count dictates phase separation in Heusler alloys, *Phys. Rev. Mater.* **6** (2022) 054406 [[doi](#)]
9. E. E. Levin, D. A. Kitchaev, Y. M. Eggeler, **J. A. Mayer**, P. Behera, D. S. Gianola, A. Van der Ven, T. M. Pollock, and R. Seshadri, Influence of plastic deformation on the magnetic properties of Heusler MnAu₂Al, *Phys. Rev. Mater.* **5** (2021) 014408. [[doi](#)]
8. J. H. Martin, B. Yahata, **J. A. Mayer**, R. Mone, E. Stonkevitch, J. Miller, M. O'Masta, T. Schaedler, J. Hundley, P. Callahan, and T. Pollock, Grain refinement mechanisms in additively manufactured nanofunctionalized aluminum, *Acta Mater.* **200** (2020) 1022–1037. [[doi](#)]
7. A. Pramanik, **J. A. Mayer**, S. Patibandla, K. Gates, Y. Gao, D. Davis, R. Seshadri, and P. C. Ray, Mixed-dimensional heterostructure material-based SERS for trace level identification of breast cancer-derived exosomes, *ACS Omega* **5** (2020) 16602–16611. [[doi](#)]
6. C. Lenardi, **J. A. 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. A. 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. A. 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

Nanoparticle composite welding filler materials, and methods for producing the same; B. Yahata, **J. A. Mayer**, and J. H. Martin. (March 30, 2021) US Patent 10960497.

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