

ZACHARY C. CORDERO

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ACADEMIC APPOINTMENTS

Massachusetts Institute of Technology 2020 – present	Boeing Assistant Professor Aeronautics and Astronautics (AeroAstro)	Cambridge, MA
Rice University 2016 – 2020	Assistant Professor Materials Science and NanoEngineering (MSNE)	Houston, TX
Oak Ridge National Laboratory 2015 – 2016	Postdoctoral Fellow Materials Science & Technology Division (MSTD)	Oak Ridge, TN

EDUCATION

Massachusetts Institute of Technology 2015	Ph.D. in Materials Science and Engineering <i>Thesis:</i> “Microstructure Design of Mechanically Alloyed Materials” <i>Advisor:</i> Prof. Christopher A. Schuh <i>Committee:</i> Prof. Thomas W. Eagar, Prof. Michael J. Demkowicz <i>Minor:</i> Computational Science and Engineering	Cambridge, MA
Massachusetts Institute of Technology 2010	B.Sc. in Physics <i>Minor:</i> Economics	Cambridge, MA

AWARDS AND HONORS

- Air Force Office of Scientific Research, Young Investigator (YIP) Program (2020)
- Acta Materialia, Outstanding Reviewer (2017)
- MIT DMSE, Graduate Student Teaching Award (2015)
- Air Force, NDSEG Graduate Fellowship (2012 – 2015)
- Dow Chemical Company, Dow Graduate Fellowship (2011)

JOURNAL ARTICLES

Colors denote **undergraduates**, **graduate students**, and **postdoctoral fellows** advised by Cordero. Superscript † denotes the corresponding author.

[J19] [Carazzone JR](#), [Martin CL](#), **Cordero ZC**[†]. “Crack initiation, propagation, and arrest in sintering powder aggregates”, *Journal of the American Ceramic Society*, 1–20 (2020).

- [J18] Ware LG, Suzuki DH, Cordero ZC[†]. “Thermodynamic stability and kinematic accessibility of curved grain boundaries in directionally solidified bicrystals”, *Journal of Materials Science*, 55: 8564–8575 (2020).
- [J17] Moustafa AR, Durga A, Lindwall G, Cordero ZC[†]. “Scheil ternary projection (STeP) diagrams for designing additively manufactured functionally graded metals”, *Additive Manufacturing*, 32: 101008 (2020).
- [J16] Poole LL, Gonzales M, French MR, Yarberr WA, Moustafa AR, Cordero ZC[†]. “Hypervelocity impact of PrintCast A356/316L composites”, *International Journal of Impact Engineering*, 136: 103407 (2020).
- [J15] Ward AA, Cordero ZC[†]. “Junction growth and interdiffusion during ultrasonic additive manufacturing of multi-material laminates”, *Scripta Materialia*, 177: 101-105 (2020).
- [J14] Carazzone JR, Bonar MD, Baring HW, Cantu MA, Cordero ZC[†]. “In situ observations of cracking in constrained sintering”, *Journal of the American Ceramic Society*, 102:602-610 (2019).
- [J13] Ward AA, Zhang Y, Cordero ZC[†]. “Junction growth in ultrasonic spot welding and ultrasonic additive manufacturing”, *Acta Materialia*, 158: 393-406 (2018).
- [J12] Moustafa AR, Dinwiddie RB, Pawlowski AE, Splitter DA, Shyam A, Cordero ZC[†]. “Mesostructure and porosity effects on the thermal conductivity of additively manufactured metallic composites”, *Additive Manufacturing*, 22: 223-229 (2018).
- [J11] Ware LG, Suzuki DH, Wicker KJ, Cordero ZC[†]. “Grain boundary manipulation in directionally solidified bicrystals and tricrystals”, *Scripta Materialia*, 152: 98-101 (2018).
- [J10] Ward AA, French MR, Leonard DN, Cordero ZC[†]. “Grain growth during ultrasonic welding of nanocrystalline alloys”, *Journal of Materials Processing Technology*, 254: 373-382 (2018).
- [J9] Pawlowski AE*, Cordero ZC*[†], French MR, Muth TR, Dinwiddie RB, Carver KR, Shyam A, Elliott AM, Splitter DA. “Damage-tolerant metallic composites via melt infiltration of additively manufactured preforms”, *Materials & Design*, 127: 346-351 (2017). * = authors contributed equally
- [J8] Cordero ZC[†], Siddel DH, Peter WH, Elliott AM. “Strengthening of ferrous binder jet 3D printed parts through bronze infiltration”, *Additive Manufacturing*, 15: 87-92 (2017).
- [J7] Cordero ZC[†], Dinwiddie RB, Immel D, Dehoff RR. “Nucleation and growth of chimney pores during electron-beam additive manufacturing”, *Journal of Materials Science*, 52: 3429-3435 (2017).
- [J6] Cordero ZC[†], Meyer III HM, Nandwana P, Dehoff RR. “Powder-bed charging during electron-beam additive manufacturing”, *Acta Materialia*, 124: 437-445 (2017).
- [J5] Cordero ZC, Knight BE, Schuh CA[†]. “Six decades of the Hall-Petch effect—a survey of grain-size strengthening studies on pure metals”, *International Materials Reviews*, 61: 495-512 (2016).
- [J4] Cordero ZC, Carpenter RR, Schuh CA, Schuster BE[†]. “Sub-scale ballistic testing of ultrafine grain tungsten alloys”, *International Journal of Impact Engineering*, 91: 1-5 (2016).
- [J3] Huskins EL, Cordero ZC, Schuh CA, Schuster BE[†]. “Micropillar compression testing of powders”, *Journal of Materials Science*, 50: 7058-7063 (2015).

- [J2] **Cordero ZC**, Schuh CA[†]. “Phase strength effects on chemical mixing in extensively deformed alloys”, *Acta Materialia*, 82:123-136 (2015).
- [J1] **Cordero ZC**, Huskins EL, Park M, Livers S, Frary M, Schuster BE, Schuh CA[†]. “Powder-route synthesis and mechanical testing of ultrafine grain tungsten alloys”, *Metallurgical and Materials Transactions A*, 45:3609-3618 (2014).

CONFERENCE PROCEEDINGS

- [C4] **Grant LO**, **Alameen MB**, **Carazzone JR**, Higgs III CF, **Cordero ZC[†]**. “Mitigating distortion during sintering of binder jet printed ceramics”, *Solid Freeform Fabrication Symposium Proceedings*, (2018).
- [C3] **Catalanotto AM**, **Ware LG**, **Chagolla JA**, **Suzuki DH**, **Cordero ZC[†]**. “Stereolithography-based manufacturing of molds for directionally solidified castings”, *Solid Freeform Fabrication Symposium Proceedings*, (2018).
- [C2] Leonard DN, **Ward AA**, **French MR**, **Cordero ZC[†]**. “Effects of ultrasonic welding on nanocrystalline Ag-W investigated with 30 kV transmission Kikuchi diffraction (tKD) and 300 kV STEM SE imaging”, *Microscopy and Microanalysis*, 23.S1:580-581 (2017).
DOI: 10.1017/S1431927617003580
- [C1] **French MR**, **Yarberry III WA**, Pawlowski AE, Shyam A, Splitter DA, Elliott AM, Carver JK, **Cordero ZC[†]**. “Hypervelocity impact of additively manufactured A356/316L interpenetrating phase composites”, *Solid Freeform Fabrication Symposium Proceedings*, 1-9 (2017).

INTELLECTUAL PROPERTY

- [P2] Pawlowski AE, Shyam A, Splitter DA, Elliott AM, Cordero ZC. “Additive manufactured interpenetrating phase composite.” U.S. Patent Application No. 16/389,280. October 24, 2019.
- [P1] Schuh CA, Cordero ZC, Park M. “Nanocrystalline alloy penetrators”, U.S. Patent Application No. 15/268,096. August 17, 2017.

INVITED LECTURES

- [L23] “The sinter-cracking and distortion behaviors of sintering 3D printed ceramics”, *CIMTEC 2020*, June 2020, Montecatini Terme, Italy.
- [L22] “Ultrasonic processing of bulk nanostructured materials”, *Virginia Tech – Materials Science and Engineering*, December 2019, Blacksburg, VA.
- [L21] “Ultrasonic processing of bulk nanostructured materials”, *Texas A&M University – Materials Science and Engineering*, November 2019, College Station, TX.
- [L20] “Specialized additive manufacturing for mission-critical applications”, *University of North Texas – Materials Science and Engineering*, April 2019, Denton, TX.
- [L19] “Specialized additive manufacturing for mission-critical applications”, *Carnegie Mellon University – Mechanical Engineering*, March 2019, Pittsburgh, PA.
- [L18] “Specialized additive manufacturing for mission-critical applications”, *MIT – AeroAstro Department*, March 2019, Cambridge, MA.

- [L17] “Specialized additive manufacturing for mission-critical applications”, UC Santa Barbara – Materials Department, February 2019, Santa Barbara, CA.
- [L16] “Ultrasonic processing of bulk nanostructured materials”, Oak Ridge National Laboratory – Materials Science and Technology, January 2019, Oak Ridge, TN.
- [L15] “Microstructure design via metal additive manufacturing”, Exxon Mobil – Corporate Research Center, October 2018, Clinton, NJ.
- [L14] “Mitigating slumping and cracking during sintering of binder jet 3D printed components”, Kennametal, August 2018, Latrobe, PA.
- [L13] “Ductile fracture in sintering materials: *in situ* observations and discrete element simulations”, THERMEC International Conference on Processing and Manufacturing of Advanced Materials, July 2018, Paris, France.
- [L12] “Causes and consequences of powder bed charging during electron-beam additive manufacturing”, 2018 Joint Conference on Electrostatics, June 2018, Boston, MA.
- [L11] “Additive manufacturing of periodic metal-metal composites”, TMS Annual Meeting, February 2018, Phoenix, AZ.
- [L10] “Controlling form and microstructure for high-performance additively manufactured parts”, ASM – Gulf Coast Chapter, September 2017, Houston, TX.
- [L9] “Defect-free metal additive manufacturing using physics-based process models”, University of Houston – Materials Science and Engineering, September 2017, Houston, TX.
- [L8] “Defect-free metal additive manufacturing using physics-based process models”, Stony Brook University – Materials Science & Chemical Engineering, April 2017, Stony Brook, NY.
- [L7] “Defect-free metal additive manufacturing using physics-based process models”, Baker Hughes, November 2016, Houston, TX.
- [L6] “Defect-free metal additive manufacturing using physics-based process models”, NASA Johnson Space Center, November 2016, Houston, TX.
- [L5] “Microstructure design of mechanically alloyed materials”, TMS Annual Meeting, February 2016, Nashville, TN.
- [L4] “Microstructure design of mechanically driven materials”, Rice University – Materials Science and NanoEngineering, May 2015, Houston, TX.
- [L3] “Microstructure design of mechanically driven materials”, Iowa State University – Materials Science and Engineering, January 2015, Ames, IA.
- [L2] “Application of driven alloy theory to predict chemical mixing during extensive plastic deformation”, MRS Fall Meeting, December 2014, Boston, MA.
- [L1] “Phase strength effects on forced chemical mixing during severe plastic deformation”, SES Annual Technical Meeting, October 2014, West Lafayette, IN.

MENTORING AND ADVISING

- *Postdoctoral Scholars:*

Christopher Reyes
Abdel Moustafa

Rice University, MSNE
Rice University, MSNE

Spring 2019 – Spring 2020
Summer 2017 – present

- *Graduate Advisees:*

- Ph.D.

Carlos Parra	Rice University, MSNE	Fall 2018 – present
Lynnora Grant	Rice University, MSNE	Fall 2017 – present
Austin Ward	Rice University, MSNE	Fall 2016 – present
Reid Carazzone	Rice University, MSNE	Fall 2016 – Fall 2019
Logan Ware	Rice University, MSNE	Fall 2016 – Spring 2020

- S.M.

Andres Garcia Jimenez	MIT, AeroAstro	Fall 2020 – present
Harsh Bhundiya	MIT, AeroAstro	Fall 2020 – present
Spencer Taylor	MIT, AeroAstro	Fall 2019 – present

- Professional Masters

Sebastian Eder	Rice University, MSNE	Fall 2018 – Spring 2019
Philip Xiang	Rice University, MSNE	Fall 2018 – Spring 2019
William Yarberry III	Rice University, MSNE	Spring 2016 – Fall 2017
Yibing Zhang	Rice University, MSNE	Fall 2016 – Spring 2017
Jimena Ochoa	Rice University, MSNE	Fall 2016 – Spring 2017

- *Undergraduate Researchers:*

Isabel Sjodin	Rice University, CHBE	Spring 2019 – present
Ben Herstein	Rice University, PHYS	Spring 2019 – present
Christopher Fang	Rice University, MECH	Spring 2019 – present
Hope Fa-Kaji	Rice University, MECH	Fall 2018 – Spring 2019
Caroline Krawczyk	Rice University, MECH	Fall 2018 – Spring 2019
Magdi Alameen	Houston Community College	Summer 2018 – Spring 2019
Jackson Mang	Houston Community College	Summer 2018 – Spring 2019
Angel Chagolla	Houston Community College	Summer 2018
Henry Baring	Rice University, MSNE	Spring 2018 – Spring 2019
Nathan Palmerio	Rice University, MSNE	Spring 2018 – present
Mark Cantu	Rice University, MSNE	Spring 2018 – present
Kelly Park	Rice University, MSNE	Spring 2018
Chris Hareland	Rice University, MSNE	Fall 2017 – Spring 2019
Lauren Poole	Rice University, CHBE	Fall 2017 – Spring 2019
Andrew Catalanotto	Houston Community College	Summer 2017 – Spring 2018
Nathaniel Ocanas	Houston Community College	Summer 2017 – Spring 2018
Daniel Suzuki	Rice University, MSNE	Summer 2017 – Spring 2018
Michael Bonar	Rice University, MSNE	Summer 2017 – Spring 2018
Matthew Weatherman	Rice University, MSNE	Fall 2016 – Spring 2018
Matthew French	Rice University, MSNE	Summer 2016 – Spring 2018
Kelsi Wicker	Rice University, MECH	Summer 2016 – Spring 2017

- *K-12 Teachers:*

Raquel Torres	Houston Independent School District	Summer 2017
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PROFESSIONAL SERVICE

- *Professional Engineer*: Registered in TX, PE Number: 132755
- *Workshop Organizer*:
 - Inaugural Symposium of the Additive Manufacturing, Performance, and Tribology Research Center at Rice University (Summer 2019)
 - Rice University Contact Mechanics Workshop (Spring 2017)
- *Symposium Organizer*:
 - “Binder Jet Additive Manufacturing: Materials, Modeling, and Experiments” at 2019 Solid Freeform Fabrication Symposium.
 - “Powder Processing of Bulk Nanostructured Materials” at 2019 TMS Annual Meeting and Exhibition.
 - “Sintering and Related Powder Processing Science and Technologies” at 2018 Materials Science & Technology (MS&T) Conference and Exhibit.
 - “Binder Jet Additive Manufacturing: Materials, Modeling, and Experiments” at 2018 Solid Freeform Fabrication Symposium.
- *Technical Manuscript Reviewer*: Acta Materialia, Journal of Nuclear Materials, Journal of Manufacturing Science and Engineering, Materials Today, Metallurgical and Materials Transactions A, Scripta Materialia, Science Advances
- *Grant Proposal Reviewer*: National Science Foundation (NSF) – Civil, Mechanical and Manufacturing Innovation (CMMI), Department of Energy (DOE) – ARPA-E, Department of Energy (DOE) – Office of Nuclear Energy (NE), Department of Energy (DOE) – Office of Basic Energy Sciences (BES)
- *Member*: TMS Professional Engineering Committee, Materials Research Society (MRS), ASM International – Houston chapter, The Minerals, Metals and Materials Society (TMS), Society of Hispanic Professional Engineers (SHPE)

UNIVERSITY AND DEPARTMENT SERVICE

- Chair, School Course Review Committee, School of Engineering (2017 – 2019)
- Strategic Planning Committee, School of Engineering (2017 – 2018)
- Undergraduate Advisor, Materials Science and NanoEngineering (2016 – 2020)
- *Graduate Committee Service*:

Eduardo Villarreal	Rice University, MSNE	Thesis Committee, 2016
Yuntian Zhu	Rice University, MSNE	Thesis Committee, 2017
Kaiqi Yang	Rice University, MSNE	Thesis Committee, 2018

TEACHING EXPERIENCE

Massachusetts Institute of Technology	Department of Aeronautics and Astronautics
Fall 2020	16.001 Materials and Structures
Rice University	Department of Materials Science and NanoEngineering
Spring 2019	MSNE 302 Materials Processing
Fall 2018	MSNE 409/509 Physical Metallurgy
Spring 2018	MSNE 302 Materials Processing

Fall 2017 MSNE 409/509 Physical Metallurgy
Spring 2017 MSNE 302 Materials Processing

Massachusetts Institute of Technology Department of Materials Science and Engineering
Spring 2015 3.22 Mechanical Behavior of Materials (Teaching Assistant)

OUTREACH ACTIVITIES

- **Mentor**, REU and RET programs, Rice University (2017 – Present)
- **Enhancement Lecturer**, STEM Academy, Olle Middle School (2016); Tapia! Physics Summer Camp for underrepresented minorities, Rice University (2017); STEMFab, R-STEM summer camp for ESL high-school students in HISD (2018)
- **Educational YouTube Videos**, MIT K+12 Online Education Initiative at MIT. Filmed two educational videos on the thermal tempering of glass and welding metallurgy. Combined, the videos have received over 1 million views on YouTube, and the thermal tempering video has been featured in MIT's Museum of Science and MIT's web-based solid-state chemistry course, 3.091x.