



Exponent[®]
Engineering & Scientific Consulting

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Professional Profile

Dr. Slone specializes in failure analysis and prevention with specific expertise in metallurgy and microstructure development, materials characterization, and deformation mechanisms of metals. He has extensive experience with a variety of analytical tools and techniques including metallography and optical microscopy, scanning electron microscopy (SEM), X-ray diffraction (XRD), and mechanical testing of materials across a wide range of temperatures and loading modalities.

Prior to joining Exponent, Dr. Slone was a National Science Foundation Graduate Research Fellow at The Ohio State University. He completed his Ph.D. in 2019, and his doctoral thesis focused on the influence of composition and processing on the mechanical response of high entropy alloys. This work included computationally-screened alloy design via calculation of phase diagram (CALPHAD) techniques; thermo-mechanical processing of new alloys; mechanical assessment, including hardness measurement, rate-controlled tensile testing, and high-temperature creep testing; and analysis with electron-microscopy-based techniques such as energy dispersive X-ray spectroscopy (EDS), electron backscatter diffraction (EBSD), and electron channeling contrast imaging (ECCI).

Dr. Slone has also provided characterization expertise for projects involving laser powder bed fusion (LPBF) additive manufacturing, dissimilar metal joints produced by vaporizing foil actuator welding (VFAW), and welded Ni-base superalloys used for high-temperature aerospace and power generation applications.

In addition to his analysis and research experience, Dr. Slone has also served as a teaching assistant for undergraduate and graduate materials science courses and led a practical laboratory course in scanning electron microscopy (SEM) methods.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, The Ohio State University, 2019

B.S., Materials Science and Engineering, The Ohio State University, 2014

National Science Foundation Graduate Research Fellowship, 2015

Licenses and Certifications

Licensed Metallurgical Engineer, California, #2028

Professional Affiliations

The Minerals, Metals & Materials Society (member)

American Association for the Advancement of Science (member)

Publications

C.E. Slone, J. Miao, E.P. George, M.J. Mills, "Achieving ultra-high strength and ductility in equiatomic CrCoNi with partially recrystallized microstructures", *Acta Materialia* (165), 496-507, 2019.

C.E. Slone, S. Chakraborty, M.J. Mills, S.R. Niezgodna, "Influence of deformation induced nanoscale twinning FCC-HCP transformation on hardening and texture development in medium-entropy CrCoNi alloy", *Acta Materialia* (158), 38-52, 2018.

C.E. Slone, J. Miao, M.J. Mills, "Ultra-high strength and ductility from rolling and annealing of a Ni-Cr-Co superalloy", *Scripta Materialia* (155), 94-98, 2018.

J. Miao, C.E. Slone, T.M. Smith, C. Niu, H. Bei, M. Ghazisaedi, G.M. Pharr, M.J. Mills, "The evolution of the deformation substructure in a Ni-Co-Cr equiatomic solid solution alloy", *Acta Materialia* (132), 35-48, 2017.

R.C. Kramb, P.R. Buskohl, C.E. Slone, M.L. Smith, R.A. Vaia, "Autonomic composite hydrogels by reactive printing: materials and oscillatory response", *Soft Matter* (9), 1329-1336, 2014.

M.L. Smith, C.E. Slone, K. Heitfeld, R.A. Vaia, "Designed Autonomic Motion in Heterogeneous Belousov-Zhabotinsky (BZ)-Gelatin Composites by Synchronicity," *Advanced Functional Materials* (23), 2835-2842, 2013.

M.L. Smith, K. Heitfeld, C.E. Slone, R.A. Vaia, "Autonomic hydrogels through postfunctionalization of gelatin", *Chemistry of Materials* (15), 3074-3080, 2012.

Presentations

C.E. Slone, J. Miao, E.P. George, M.J. Mills, "Ultra-high strength and anomalous hardening in FCC Medium / High Entropy Alloys", TMS 2018, March 2019, San Antonio, TX.

C.E. Slone, J. Miao, E.P. George, M.J. Mills, "Enhanced strength and ductility in Ni-Co-Cr alloys through cold work and annealing", 18th International Conference on the Strength of Materials, July 2018, Columbus, OH.

C.E. Slone, S. Chakraborty, S.R. Niezgodna, M.J. Mills, "Experimental and computational analysis of deformation in solid solution and precipitation strengthened Ni-Cr-Co alloys", TMS 2018, March 2018, Phoenix, AZ.

C.E. Slone, M.J. Mills, "Elevated temperature tensile and creep behavior of equiatomic NiCrCo", TMS 2018, March 2018, Phoenix, AZ.

C.E. Slone, M.J. Mills, "Analysis of strain localization during creep of a polycrystalline superalloy using SEM-DIC", TMS 2017, February 2017, San Diego, CA.

C.E. Slone, D.H. Bechetti, J.N. DuPont, M.J. Mills, "Localized deformation under severe microstructural gradients", National Science Foundation Center for Integrative Materials Joining Science for Energy Applications Meeting, January 2017, Columbus, OH.

C.E. Slone, M.J. Mills, "Measurement of strain localization during creep of a polycrystalline superalloy using SEM-based digital image correlation", MS&T16, October 2016, Salt Lake City, UT.

C.E. Slone, D.H. Bechetti, J.N. DuPont, M.J. Mills, "Local measurement of creep deformation in polycrystalline superalloys", TMS 2016, February 2016, Nashville, TN.

C.E. Slone, D.H. Bechetti, J.N. DuPont, M.J. Mills, "Fundamental understanding of localized deformation under severe microstructural gradients", National Science Foundation Center for Integrative Materials Joining Science for Energy Applications Meeting, July 2014, Golden, CO.