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Engineering & Scientific Consulting

Tyler Lucas, Ph.D.

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Professional Profile

Dr. Lucas specializes in the mechanical behavior of metals such as steels, copper, and nickel alloys, and the processing and microstructural influences of these metals on mechanical properties. Dr. Lucas has experience with numerous characterization and analysis techniques, including scanning electron microscopy (SEM), laser scanning confocal microscopy (LSCM), high-speed photography, metallographic preparation and characterization, X-ray fluorescence (XRF), finite element analysis (FEA), smoothed particle hydrodynamics (SPH), and machine learning techniques.

Prior to joining Exponent, Dr. Lucas completed his Ph.D. in Materials Science and Engineering at the Massachusetts Institute of Technology. His graduate research included study of high velocity impacts on metals to deepen understanding of the influence of microstructure on material properties at extremely high strain rates. In addition to experimental methods, Dr. Lucas employed advanced finite element and meshless dynamic modeling to quantify the interplay between plasticity, temperature, and fracture evolution during high strain rate conditions and improve the predictive capabilities of constitutive models. During his undergraduate studies in Materials Science and Engineering at Purdue University, Dr. Lucas conducted research in the automation of characterizing casting anomalies in Al-Cu alloy systems. Dr. Lucas also has completed industry internships involving quality in an aluminum production facility, validating customer product specifications in castings, manufacture of components for commercial nuclear power, and characterization of welded and brazed materials.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Massachusetts Institute of Technology, 2025

B.S., Materials Science and Engineering, Purdue University, 2020

Publications

Lucas TJ, Schuh CA. Measuring the strength of ductile microparticles at extreme strain rates. Scripta Materialia 2025; 257:116446.

Lucas TJ, Saunders AM, Schuh CA. Microstructure effects on high velocity microparticle impacts of copper. Acta Materialia 2024;280:120329.

Tiamiyu AA, Lucas TJ, Pang EL, Chen X, LeBeau JM, Schuh CA. Heterogeneous microstructural evolution during hydrodynamic penetration of a high-velocity copper microparticle impacting copper. Materials Today 2024; 72:71-86.

Presentations

Lucas TJ, Schuh CA. Microstructure effects on dynamic hardness in high velocity microparticle impacts. Oral presentation, The Minerals, Metals & Materials Society, Orlando, FL, 2024.

Lucas TJ, Lienhard J, Saunders AM, White JL, Schuh CA. In situ analysis and modeling of high velocity microparticle impacts on tin. Oral presentation, APS Shock Compression of Condensed Matter, Anaheim, CA, 2022.

Peer Reviews

International Journal of Mechanical Sciences