

UNIVERSITY OF CALIFORNIA, IRVINE

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

IS PROUD TO HOST A SEMINAR BY

***“SCIENCE-BASED ADVANCED
MANUFACTURING OF METALS AND
ALLOYS”***



AMY J. CLARKE

**DISTINGUISHED SCIENTIST
SIGMA MANUFACTURING
SCIENCE DIVISION
LOS ALAMOS NATIONAL LABORATORY**

Thursday, February 6, 2025

2:00 PM - 3:20 PM

McDonnell Douglas Engineering Auditorium

Abstract: Solidification is the first step encountered during the processing of metals and alloys. Significant opportunity exists to not only employ conventional processes like metal casting, but also emerging processes like additive manufacturing (AM) that typically produce large temperature gradients, high solidification rates, and repeated cycles of heating and cooling. The local conditions experienced during solidification processes (e.g., thermal gradients and solid-liquid interface velocities) dictate microscopic structure (i.e., microstructure) evolution and the final microstructural state. Here we visualize solidification dynamics during metal casting, directional solidification, and simulated AM by real-time imaging with protons, synchrotron x-rays, and electrons, for example, and computational modeling to link processing conditions to microstructure development. A deeper understanding of solidification is needed to predict and control microstructure evolution, optimize processing conditions, and achieve advanced manufacturing of metals and alloys.

Bio: Amy J. Clarke is a Distinguished Scientist in the Sigma Manufacturing Science Division at Los Alamos National Laboratory and holds a faculty joint appointment with the Department of Metallurgical and Materials Engineering at the Colorado School of Mines (Mines). Amy serves as Director of a multi-university, National Nuclear Security Administration (NNSA) Stewardship Science Academic Alliances Center of Excellence on Advanced Characterization of Metals under Extreme Environments at Mines. Her research focuses on physical metallurgy; making, measuring, and modeling metallic alloys during processing to realize advanced manufacturing; and processing-structure-properties-performance relationships in metals and alloys. Amy received her MS and PhD degrees from Mines and her BS degree from Michigan Technological University in Metallurgical and Materials Engineering. She serves on The Minerals, Metals & Materials Society (TMS) Foundation Board of Trustees, as an Editor for Metallurgical and Materials Transactions A, and has served on the TMS and Association for Iron & Steel Technology Boards of Directors. She is a past recipient of a Presidential Early Career Award for Scientists and Engineers (nominated by the U.S. Department of Energy (DOE) and NNSA Defense Programs), U.S. DOE Office of Science Early Career Research Program award, Office of Naval Research Young Investigator Program, and Mines Excellence in Research Award (Senior). She is also a TMS Brimacombe Medalist and Fellow of ASM International.

