THE UNIVERSITY OF ARIZONA

Arizona State University

MateriAlZ Seminar Series

Linking Microstructure Control and Additive Manufacturing

Friday, October 2, 2020, 11 am MST

Abstract

As additive manufacturing (AM) technology matures into a viable manufacturing platform, demands to broaden the range of available alloy systems have increased beyond the handful of currently available systems in AlSi10Mg, TiAl6V4, CoCr, and Inconel 718. Recently, HRL Laboratories demonstrated that surface functionalization of feedstock powder enables control of solidification mechanisms in powder bed selective laser melting enabling the world's first crack free additively manufactured 6000 and 7000 series aluminum alloys. Using an updated understanding of strain energy controlled nucleation and growth, lattice-matched nucleants can be designed to promote fine, equiaxed grain growth. This provides greater accommodation of large strains during solidification and a control mechanism for optimizing the process-structure-property paradigm. This presentation will discuss the theory, modelling, and physical results associated with developing the microstructure control mechanisms which have enabled commercial AM production of high strength 7000 series alloys for the first time.

Dr. Hunter Martin

HRL Laboratories LLC.

Hunter Martin is the lead metallurgist and a Research Staff member in the Materials and Microsystems Laboratory at HRL Laboratories and co-founder of HRL's Center for Additive Materials (CAM). Dr. Martin received a B.Sc. in Material Science and Engineering from the University of Washington and a PhD in Materials from the University of California, Santa Barbara in collaboration with Prof. Tresa Pollock. His research focuses on the physics of nucleation and growth in metal alloy systems and has led multiple internal development programs focused on development of new metal alloys for additive manufacturing. Dr. Martin currently has active research programs in adjacent research areas, including the development and commercialization of new powder metallurgy and electrodeposition technologies for industry (General Motors and Boeing) and US Government agencies (US Army AMRDEC).

Zoom link: https://arizona.zoom.us/j/97801611444; passcode: 366975