Additive Manufacturing: Where It Needs to Go and How to Get There

Tuesday, January 30 @ 4PM | Room: BB W250

Dr. Owen Hildreth is an Assistant Professor at the School for Engineering of Matter, Transport, and Energy (SEMTE) at Arizona State University (ASU). He received his B.S. in Mechanical Engineering from the University of California, San Diego in 2002 and worked for five years as a mechanical engineer designing consumer products. In 2012 received his Ph.D. in Materials Science and Engineering from the Georgia Institute of Technology under the supervision of Prof. C. P. Wong. His Ph.D. research identified the mechanism for catalyst motion in metal assisted chemical etching (MacEtch) for applications in 3D nanofabrication. His current research areas focus on additive manufacturing (nm to cm scales); mass transport, reaction kinetics, and interface design in reactive inks for stretchable electronics, photovoltaics, and microfluidic devices; sensitization kinetics, microstructure evolution, dilution, and corrosion of metals fabricated using Powder Bed Fusion (PBF) and Directed Energy Deposition (DED) technologies.

Abstract:

The long-term goal of Dr. Hildreth's research is to replace massive buildings and global supply chains with 3D printers capable of fabricating complex, integrated devices at the push of a button. Toward this goal, his research focuses on advancing additive manufacturing to point that we can control the arbitrary composition, position, and state of matter in 3D space with nanometer resolutions. Dr Hildreth's talk will discuss new approaches to additive manufacturing that will help this technology make manufacturing a local endeavor while reducing ecological costs and enabling entire technologies. It will first give a brief overview of the ~50-year history of additive manufacturing within the context of what challenges and limitations exist within current technologies. Next, it will detail advances in reactive ink chemistries and how, by printing chemical reactions instead of particles, we can improve feature resolution, improve device performance, enable multi-material direct manufacturing, and reduce materials cost by orders of magnitude. Lastly, the talk will highlight how new perspectives can often solve old problems by detailing Dr. Hildreth's unique approach towards dissolvable metal supports for 3D printed metals.

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