
Friday, December 4, 12:00-1:00 pm

Join the Zoom Mtg, instructions sent via email

Dr. Amit K. Verma, MFI Postdoctoral Fellow, Materials Science and Engineering
Research Advisor: A.D. (Tony) Rollett

Robotic Laser Wire Additive Manufacturing System with Comprehensive Quality Assurance Framework

Additive manufacturing (AM) is a rapidly advancing technology that holds great potential for revolutionizing the fabrication of structural metallic components. Unlike traditional metal fabrication where the material and the part are made in separate operations, in AM the material and part are made simultaneously. This provides tremendous flexibility for on-demand fabrication. However, it also shifts the burden of quality assurance to the part fabricator. Additionally, the highly complex nature of AM systems, with many operational degrees of freedom, makes it very difficult to achieve assured repeatability from part-to-part and across different AM platforms. Hence, one of the major limiting factors inhibiting rapid adoption of metal AM processes is the uncertainty regarding quality and repeatability. This talk will focus on how material and process modeling, implemented through an intelligent closed-loop control system can close this gap. The focus will be on Ti-6Al-4V.

Need for Materials Informatics Platform for Exploring New Design Space for High Temperature Materials

The era of big data is pushing the adoption of machine learning (ML) and artificial intelligence (AI) across all domains of science. In 2011, the materials science community saw a similar shift with the advent of The Materials Genome Initiative (MGI). With eight years in practice, the initiative has led to the rapid development of databases, although these databases remain centered around the first principles calculations. For high temperature materials, where most of the properties need to be experimentally determined, the data problem still persists. To bridge the gap, we are using Natural Language Processing (NLP) tools to extract information directly from published text. The talk will focus on methodologies that are being developed for curating this database and will briefly discuss the range of applications that could benefit from this endeavor.

BIOGRAPHY



Amit K. Verma is a Manufacturing Futures Initiative (MFI) postdoctoral fellow, working within the confines of Materials Science and Engineering Department at Carnegie Mellon University (CMU). He received his B. Tech in Metallurgical Engineering from the Indian Institute of Technology – Varanasi, India in 2011. After a few years of working at a steel recycling plant, coupled with teaching non-profits and a research position at the Indian Institute of Science – Bangalore, India, he moved to Cleveland, OH in 2014 to pursue his MS and PhD at Case Western Reserve University. He received his MS in 2016, PhD in 2019, and joined CMU in Fall 2019. His research interest lies at the intersection of machine learning and materials science, a domain commonly known as materials informatics, and its application in materials design. His current work at CMU follows the same theme, with a primary focus on structural materials and their design.