

Role of materials science and engineering in metal additive manufacturing

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Abstract

Additive Manufacturing or Direct Manufacturing, popularly known as 3D Printing, has become the leading-edge manufacturing technology. Today Metal Additive Manufacturing (MAM) is a reality, not only for prototype fabrication, also for functional parts in all industrial sectors. Design freedom that the AM processes offer has led to design and engineering of new, complex, light-weight structures in all applications. However, in order to realize further and widespread use of metal AM for manufacturing critical components, it is necessary to explore the inherent material freedom in AM. While new metal AM materials are being developed, the role of Materials Science and Engineering (MSE) is becoming more apparent than ever before. This presentation will highlight the increasing role of Materials Science and Engineering in metal AM technologies. This presentation will show the essence of metallurgical principles in realizing full scope of material freedom in metal additive manufacturing. This presentation will demonstrate how fundamental MSE principles can be utilized to develop new materials, optimize metal AM and post processing, and their controls that cannot be achieved by conventional manufacturing methods. The examples with new AM alloys based on Al, Ti, and Ni will be presented, leading to a path of developing advanced and higher performance products for critical applications.

Biography

Prabir K Chaudhury is President and Consultant at Education and Consulting LLC. He is engaged in advancing materials and processing technologies for Metal Additive Manufacturing. During his professional career, he has worked in and with the metalworking industry to develop new materials, processes and products. Recently he has developed and patented high-performance aluminum alloys for Laser Powder Bed Fusion (LPBF) AM process. He has authored and instructed many Materials Science and Engineering (MSE) courses to engineering professionals and university students. He has a PhD in Engineering from University of California, Irvine. He is a recipient of Phi Beta Kappa International Student award as well as the ASM International Lecturer of the Year award. He has published approximately 50 refereed journals and conference proceedings, more than 100 Atlas of Formability bulletins, and made numerous presentations at conferences and professional meetings.

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