USC Viterbi
Center for Advanced Manufacturing

Advanced Manufacturing Seminar Series

Friday, March 19, 2021
10:00 AM – 11:30 AM (Pacific Time)

Registration link: https://usc.zoom.us/webinar/register/WN_-jklT28WSJ2J7rGF-jptng

Additive Manufacturing of Advanced Ceramics: Technologies, Applications and Opportunities

Dr. Ming C. Leu
Keith and Pat Bailey Distinguished Professor, Department of Mechanical and Aerospace Engineering
Missouri University of Science and Technology

Abstract: Ceramics are important engineering materials due to their unique properties such as high hardness, high-temperature resistance, and high-corrosion resistance. Additive manufacturing (AM) of ceramic material is difficult and challenging because of the high melting temperature and flaw-sensitive nature of ceramics. However, through intensive research over the past two decades, significant progress on AM of ceramics has been made. This talk will first review different categories of ceramic AM processes and recent technology advances in each category. Comparisons will be made on the advantages and limitations of each ceramic AM process category in terms of part quality, dimensional accuracy, surface finish, and material flexibility. The practical applications of various ceramic AM processes in relation to the characteristics of each process category will be described. A novel extrusion-based AM process, called Ceramic On-Demand Extrusion (CODE), which was developed in recent years by the seminar speaker's research group for fabricating ceramic components with near theoretical density will be presented, including choice of support material and part fabrication with multiple and graded materials. Finally, future research needs and innovation opportunities of ceramic AM will be discussed.

Biography: Dr. Leu's research interests include additive manufacturing, 3D printing, intelligent robotics & automation, and cyber-physical manufacturing. He has published over 480 papers in referred professional journals and conference proceedings. Dr. Leu has received numerous professional awards including, among others, the International Freeform and Additive Manufacturing Excellence (FAME) Award (2020), ASME Milton C. Shaw Manufacturing Research Medal (2018), University of Missouri President's Leadership Award (2017), ASME Blackall Machine Tool and Gage Award (2014), ISFA Hideo Hanafusa Outstanding Investigator Award (2008), ASME Distinguished Service Award (2004), SME University Lead Award (1994), NJIT Harlan J. Perlis Research Award (1993), NSF Presidential Young Investigator Award (1985), SAE Ralph R. Teetor Education Award (1985), as well as several best paper awards.