Open-Architecture Metals Additive Manufacturing: An Emerging Disruptive Influence on an Already Disruptive Technology

Dr. John Middendorf, **Dr. Olga Ivanova**, and Dr. Ty Pollak
Universal Technology Corporation, Dayton, OH

Abstract

Less than a decade ago, a revolution occurred in the 3D printing industry as low-cost desktop 3D printers emerged as a new class of consumer product, led by MakerBot and others. First viewed as novelties, desktop printers soon proved capable of build performance comparable to industrial-grade 3D printing systems of the day for many applications. The result was an explosion of system sales and decrease in system costs due to increased competition, leading to the widespread adoption of polymer-based 3D printing across industries. The metals additive manufacturing (AM) industry is marching towards a similar turning point in history. The proliferation of metals AM systems is very recent, increasing from fewer than 200 systems sold worldwide in 2012 to more than 1,700 systems in 2017[1]. While sales and performance are increasing, the systems present many obvious and not-so-obvious challenges which limit their potential to provide ultimate design freedom for the researcher and manufacturer. These challenges include their high price (typically >$500k), high operating costs, limited flexibility for system/process customization, lack of validated tools for qualification, and steep learning curve for reliable builds. In this talk, we will present emerging open-architecture solutions to address these challenges. Over recent years, research and development efforts have culminated in modular, low cost, highly versatile laser powder bed systems and integrated sensors capable of build qualities on par with industrial-grade systems. Further, these systems allow unprecedented freedom for controlling process parameters and developing novel processing/sensing/control technologies. The outcome of this talk will be definition of a new “open systems” vision for the future of the metals AM industry.

Biography of Presenter

Dr. Olga Ivanova is Principal Scientist, Multi-Material Additive Manufacturing/3D Printing, at Universal Technology Corporation (UTC), a small business focused on R&D and commercialization of innovative technologies. Dr. Ivanova received her Ph.D. in Chemistry from the University of Louisville in 2010. Since then, she has focused her scientific career on AM/3DP, securing over $2M in external/internal funding since 2014, ranging from 3D printing of military garments, medical devices, pyrotechnic compositions, and multi-material parts; and developing proof-of-concept multi-material printers and AM authentication methods. Currently, her research is focused on exploitation of open-architecture AM systems for new applications.

[1] Source: 2018 Wohlers Report