



Additive Manufacturing of Metals: Current Status and Future Outlook

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Dr. Todd Palmer is a Professor of Engineering Science and Mechanics, a Professor of Materials Science and Engineering, and the director of the Center for Innovative Sintered Products (CISP) at Penn State. Previously, he was a metallurgist at Lawrence Livermore National Laboratory and a Senior Scientist at the Applied Research Laboratory at Penn State. His current research focuses on the laser and electron beam joining and additive manufacturing of metallic materials. He has nearly 20 years of experience in high energy density joining of metallic systems and is the author of more than 80 articles and reports as well as the chair of the C7 Committee on High Energy Beam Welding and Cutting for the American Welding Society. Much of this work has involved an in depth understanding of process-structure-property relationships leading to defect formation during laser and electron beam welding as well as process development to avoid or mitigate the formation of these defects.



Abstract:

The Additive Manufacturing (AM) of metallic systems represents both great promise for the larger scale application of AM and challenges in producing structurally sound components with consistent material properties. The characteristic layer-by-layer deposition of the AM process produces complex processing conditions that can lead to unique microstructures and properties. In addition, it provides the opportunity to much more easily integrate different materials into complex geometries. Significant work is being undertaken globally on improving the process understanding as well as characterizing material properties in AM fabricated monolithic and functionally graded metallic components. Much of this future promise for AM processing of metals will depend on the development of new alloy systems and improved understanding and control of the processing conditions. This seminar will discuss how recent road mapping efforts have identified future directions for research in these areas.



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