Uniform margins of 2.54 cm. **Title: Arial, 14 pt font bold.** Text: Arial, 12 pt font

Microstructural Control in Additive Manufacturing of Metal Alloys

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AM is a gateway to unexplored metallurgical phenomena that must be understood to open the full potential of the technology in terms of cost, design-flexibility and design-complexity. The steady-state conditions assumed during traditional manufacturing processes are not valid in AM, because of the spatial and temporal transients imposed by the abrupt, cyclical changes in energy delivery. The intrinsic microstructural heterogeneity throws new challenges at the familiar notion of a 'microstructure-property' relationship. This lecture will present recent advances in the design of structural engineering alloys and the way that the electron microscope and the atom probe microscope have enabled these developments. Recent breakthrough methodological advances in Transmission Kikuchi Diffraction, 3D-electron backscattered diffraction, aberration corrected scanning transmission electron microscopy, and atom probe microscopy will be presented in the context of how these techniques are enabling critical insights and data for AM process control.

Biography

Simon P. Ringer is a materials engineer specialising in the relationships between the microstructure of materials and their engineering properties and performance. His research is focused on the atomic-scale design of materials and his work spans the development of structural alloys, and functional materials. He is an expert in electron microscopy, atom probe microscopy, and computational materials simulations using density functional theory. He has held appointments in Australia, Sweden, Japan and the USA, led the establishment of a number of major research institutes and facilities, and has a global academic and industrial network. He is Professor of Materials Science and Engineering at The University of Sydney and the University's Academic Director for Core Research Facilities, where he is responsible the development of the strategy and operations of the University's major research infrastructure initiatives.