SPARC Webex Seminar

Adding Value To Additive Manufacturing-Advanced Characterization Of The Structure-Properties-Performance Of Ti6Al4V

By
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Talk 1 Tuesday 23 June 2020 3:30 pm IST 11 am BST
Talk 2 Friday 26 June 2020 3:30 pm IST 11 am BST

Talk 1: Understanding Deformation in the Scanning Electron Microscope Dr Ben Britton, Department of Materials, Imperial College London

Abstract: In this talk, we will explore methods to understand deformation in the scanning electron microscope. This will include an introduction to electron channeling contrast imaging (ECCI) which can be used to image dislocations; the used of electron backscatter diffraction (EBSD), as well as High Angular Resolution (HR) EBSD, to understand lattice strain and stored dislocation content; and finally we will briefly reveal what can be observed using high spatial resolution digital image correlation (HR-DIC). Together with these introductions, we will explore a few case studies of how these can be used to understand the performance of alloys in demanding environments.

Bio: Ben Britton leads the experimental micromechanics group, who focus on developing methods to characterise materials and understand how materials deform. The team have been developing new microscopy approaches, including EBSD techniques, as well as micromechanical testing techniques. These approaches have been applied to understand metals (Ni-, Ti-, Zr-, Fe-, Cu- based alloys) used in aerospace, oil & gas, and nuclear power applications. Their work can be explored at www.expmicromech.com. In addition to his technical work, he also openly discusses equality, diversity and inclusion activities to improve the participation of individuals in science, technology, engineering and maths. He can often be found tweeting as @bmatb.

Talk 2: Atom probe tomography and applications in oxidation and corrosion of metals Dr Stella Pedrazzini, Department of Materials, Imperial College London

Abstract: Atom probe tomography (APT) is a high-resolution characterisation technique, which provides unparalleled spatial and chemical resolution on the nanoscale. It is a form of 3D quasi-atomic scale mass spectroscopy, which gives invaluable insight in the mechanisms of oxidation and corrosion of metals. Information on oxide scale formation and growth can be gained, including atomic segregation at grain boundaries and dislocations, which can then be used to inform oxide scale growth models and mechanisms. This type of analysis can be performed on corroded crack tips as well, allowing in-depth understanding of the failure mechanisms. This kind of information would normally require correlative microscopy using multiple high-resolution techniques, though it can be obtained through atom probe tomography.

Bio: Stella Pedrazzini is a Lecturer in Engineering Alloys, EPSRC Early Career Fellow and RAEng Associate Research Fellow at Imperial College London. She works on the environmental degradation of engineering alloys, with a particular interest in oxidation and hot corrosion of nickel and cobalt-based superalloys, aqueous corrosion of steel as well as advanced characterisation techniques such as transmission electron microscopy (TEM) and atom probe tomography (APT). She got her DPhil in Materials Science from the University of Oxford in 2015, then spent 3 years as a post doc in the Oxford atom probe group. She then worked as a post-doc in the Rolls-Royce UTC at the University of Cambridge, before coming to Imperial College as a Lecturer in October 2018. In 2019 she was awarded both an EPSRC Early Career Fellowship and an RAEng Associate Research Fellowship.

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