EFFICIENT 3D CHARACTERIZATION OF TITANIUM MICROSTRUCTURES VIA SERIAL SECTIONING COMBINED WITH CORRELATIVE MICROSCOPY METHODS

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Abstract

The 3D quantification of titanium alloy microstructures-especially at scales which are relevant for engineering applications-remains a technical challenge for the materials characterization community. Over the past five years, some of the present authors have conceived and developed a multi-modal characterization system that enables automated collection of electron-optic and light microscope data from metallographically-prepared samples that are approximately 30 mm in diameter. In this presentation, we highlight emerging pathways for efficient data collection for titanium alloys via the fusing and subsequent analysis of high spatial-resolution image data with electron backscatter diffraction maps collected at lower resolution. Examples of fusing both backscattered electron and optical images will be shown, for both model single-phase and two-phase engineering alloys that have been examined by the aforementioned automated characterization system.