

IN-SITU CHARACTERIZATION OF CONDUCTIVE WTi PHOSPHATE GLASS-CERAMICS

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Glass-ceramics are formed by the controlled crystallization of glass. The final material is multi-phase, consisting of crystalline components and residual glass. The crystalline phases typically impart some functionality, such as color, a desired thermal expansion or electrical property, which is different from that of the precursor glass. W-Ti-phosphate glass ceramics have previously been shown to be excellent electrical conductors. The conductivity of these materials has been attributed to an interconnected network of needle shaped WO_{3-x} crystallites. To better understand the origin of this conductivity and to control it, it is important to understand the nucleation and crystal growth processes of this system. In this study, several in situ techniques were used to characterize the temperature dependence of the phase assemblage, microstructure and atomic level structure of selected WTi phosphate glass-ceramics. In situ X-ray diffraction was used to understand the sequence of phase transformations. In-situ TEM up to 1000°C was used to visualize the evolution of the microstructure.