

Correlation of Irradiation Responses and Microstructures in AM 316 Stainless Steels

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Abstract: Systematic helium ion irradiation was performed on AM 316 stainless steels prepared by UW-Madison group. The key interest was to study void denuded zone and zone width changes under various boundary configuration and morphology. Prior to focused ion beam lift out process, boundary angles were mapped to guide site selective characterization. The zone width was measured as a function of boundary misorientation angles, and was compared with molecular dynamics simulations. In parallel, proton irradiation is performed to study elementary segregation as a function of boundary angles. In both studies, comparisons are made with traditional 316 stainless steels. The study is important to understand whether unique microstructures from AM process can influence materials radiation responses, and to identify influencing factor to optimize the process for better radiation tolerance.