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In situ tensile testing and electron backscatter diffraction characterization of irradiated 316L from Spallation Neutron Source Targets 8 and 9

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Tensile testing of material from the Spallation Neutron Source (SNS) Target 2 showed abnormally large ductility for a specimen irradiated to approximately 5.4 displacements per atom (dpa). Subsequent electron backscatter diffraction (EBSD) characterization of these tested Target 2 specimens showed deformation-wave behavior from transformation-induced plasticity was responsible for the large ductility values observed. To study the deformation behavior of the target material after irradiation, relatively small “micro” tensile specimens were fabricated from material removed from SNS Targets 8 and 9, which were irradiated to approximately 7 dpa. In situ tensile testing of these specimens and unirradiated reference material was performed in a scanning electron microscope equipped with an EBSD detector system. EBSD maps were captured during different stages of each test to characterize the deformation mechanism(s) occurring during testing. This presentation will review the initial results from these tests and discuss future work for the SNS PIE program.

Primary author: MCCLINTOCK, David (Oak Ridge National Laboratory)

Presenter: MCCLINTOCK, David (Oak Ridge National Laboratory)

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