

## Thermal diffusivity of proton and spallation neutron irradiated tungsten

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Thermal properties of pure tungsten, irradiated in the Swiss neutron spallation source at the Paul Scherrer Institut, have been studied in the temperature range 25-500 °C. Disk-shaped specimens were prepared from a tungsten sheet which was irradiated with approximately 550 MeV protons. The specimens tested in this work received total damages of maximum 3.9 and 5.8 dpa at average irradiation temperatures of 115 and 140 °C, respectively. The thermal diffusivity of the irradiated tungsten was measured using the conventional flash method. For both specimens, the results show a significant decrease in thermal diffusivity after irradiation; attaining a value of around 35 mm<sup>2</sup>/s throughout the test temperature range. Relative to unirradiated tungsten, the irradiated samples show thermal diffusivity values which are 28-51% lower, depending on temperature. Annealing of the irradiated specimen at 1000 °C for 1 h resulted in a slight recovery of thermal diffusivity. In addition, thermal conductivity values were calculated from the observed thermal diffusivity data. The effect of decreasing thermal conductivity on the of dynamic thermal stress in the target of the European Spallation Source has also been studied.

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