

Abstract

Mechanically polished tungsten specimens were irradiated with 5.2 MeV singly-charged nitrogen ion beam using linear Pelletron accelerator. Specimens were irradiated by varying the ion fluence from 5×10^{14} to 1×10^{16} ions/cm². The structural, electrical, and mechanical characterizations were done using X-ray diffractometer, four-point probe technique, and Vickers hardness tester, respectively. XRD patterns reveal variation in the intensity of diffracted peaks which indicate the generation/annihilation of structural defects. The crystallite size was measured by using Scherrer method and was found to depend on the ion fluence. The surface hardness of un-irradiated specimen was 2.49 GPa which increased to 2.90 GPa for 1×10^{15} ions/cm². With further increase in dose upto 1×10^{16} ions/cm², the hardness remained almost constant. Similar behavior was observed for the electrical resistivity. Hall-Petch relation was observed for the surface hardness in crystallite size range 22 to 32 nm.