ABSTRACT

This work presents the modification of cadmium (Cd) surfaces by N+ ion implantation. The aim of this study is to investigate the effect of N+ ion dose on the hardness and electrochemical corrosion of Cd. Samples of Cd were implanted with 25 keV ions at doses of 1×10^{16}, 5×10^{16}, 1×10^{17}, and 5×10^{17} ions/cm^2 using an ion implanter. X-ray diffraction (XRD) measurements revealed an overall decrease in crystallite size after ion implantation, with the most significant decrease observed at 5×10^{16} ions/cm^2. This reduction in crystallinity occurred due to N+ ion-induced structural variations. The hardness of Cd increased at 1×10^{16} ions/cm^2; however, with further increases in ion dose, the hardness remained almost constant.

The surface morphology of ion-implanted Cd samples showed grooves and cavities that became more prominent with increasing ion dose. Electrochemical tests on unimplanted and ion-implanted Cd were performed in a mixture of NaOH and KOH solutions to determine the material's corrosion rate. The results showed a decrease in the corrosion rate of Cd due to N+ ion implantation. The findings of this work indicate that N+ ion implantation is an effective technique for improving the surface properties of Cd.