

Electrical characterization of MgO thin films grown by reactive magnetron sputtering

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Abstract

We report on the preparation of a lattice matched heteroepitaxial system in a magnetron sputtering discharge. $\text{Cr}_{0.7}\text{Mo}_{0.3}$ thin films were grown on $\text{MgO}(1\ 0\ 0)$ substrate using a dc discharge, and an MgO overlayer was grown on top of the alloy by reactive sputtering of an Mg target in a pulsed bipolar discharge to form a metal-insulator-metal (MIM) structure. The composition of the binary metal alloy is chosen so that the film is lattice matched to the substrate when the $\langle 100 \rangle$ direction of the film is parallel to the $\langle 011 \rangle$ direction of the substrate. The electrical properties of the MgO film were assessed by impedance spectroscopy. The structural parameters such as the surface and interface roughness were determined by low angle X-ray reflectivity measurements.