

Deposition of Cr-doped ZnO Thin Films and Their Ferromagnetic Properties

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Abstract : In this study, the Cr-doped ZnO thin films have been deposited by reactive magnetron sputtering method with different Cr-contents (1.0at.%, 2.5at.% and 12.5at.%) and their ferromagnetic properties have been characterized. All films revealed clear ferromagnetism above room temperature. However, the spontaneous magnetization of the films was observed to depend on the Cr contents in the films. Namely, the magnitude of effective magnetic moment (per each Cr ion) was exponentially decreased with increasing the Cr contents. We attributed the decreased spontaneous magnetization to the degraded crystal magnetic anisotropy. In other words, we found out that the high concentration of magnetic ions causes the lattice distortion in the magnetic ion-doped thin film, and it consequently degrades ferromagnetic channeling in the solid-state material system.

Keywords : Cr-doped ZnO, ferromagnetic properties, magnetization, sputtering, thin film

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