MAGNETIC PROPERTIES OF Fe DOPED CuO THIN FILMS AND POWDERS

Kwang Joo Kim, Hee Kyung Kim, Young Ran Park\(^1\), Geun Young Ahn, Chul Sung Kim\(^2\) and Jae Yun Park\(^3\)

\(^1\) Depart. of Physics, Konkuk Univ., Seoul 143-701, Korea; \(^2\) Department of Physics, Kookmin University, Seoul 136-702, Korea; \(^3\) Depart. of Materials Science and Engineering, Univ. of Incheon, Incheon 402-749, Korea

Fe-doped CuO thin-film and powder samples were synthesized using a sol-gel method. The CuO:Fe films were found to be insulating while the undoped ones semiconducting with p-type carriers. Li doping on the CuO:Fe films led to a ferromagnetism at room temperature as well as a restoration of the semiconductivity as in undoped ones. The observed properties of the CuO:Fe, Li films can be explained in terms of hole creation by substitution of Li\(^+\) for Cu\(^{2+}\) sites and mediation of long-range interactions between Fe\(^{3+}\) ions by the Li\(^+\)-induced defect states. CuO:Fe powders exhibited a ferromagnetism at room temperature with its strength being dependent on post-annealing temperature. Mössbauer measurements on the CuO:Fe films and powders revealed that the octahedral Cu\(^{2+}\) sites are mostly substituted by Fe\(^{3+}\) ions.