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MAGNETIC PROPERTIES OF Fe DOPED CuO THIN FILMS AND POWDERS

Kwang Joo Kim , Hee Kyung Kim, Young Ran Park¹ , Geun Young Ahn, Chul Sung Kim² and Jae Yun Park³

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 Cu²⁺ sites and mediation of long-range interactions between Fe³⁺ 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 Cu²⁺ sites are mostly substituted by Fe³⁺ ions.