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Fe DOPED FERROMAGNETIC ZnO

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Diluted magnetic semiconductor is expected to play an important role in interdisciplinary materials science and future electronics. Diluted magnetic Fe-ion (5%) doped ZnO powders were prepared with annealing in Ar or Ar/H₂(5%) atmosphere at 1200 °C. The structure, electric and magnetic properties for the Zn_{0.95}Fe_{0.05}O powders have been studied with x-ray diffraction, vibrating sample magnetometer, magnetoresistance and Hall measurement. All the peaks for the x-ray diffraction pattern of samples belong to the hexagonal (*P6₃mc*) lattice of ZnO, and no indication of a secondary phase is found as shown in Fig.1. The lattice parameters for the Zn_{0.95}Fe_{0.05}O with an annealing in Ar/H₂(5%) atmosphere were $a_0 = 3.256 \text{ \AA}$ and $c_0 = 5.206 \text{ \AA}$ at room temperature. The hysteresis curve for the Zn_{0.95}Fe_{0.05}O at room temperature was indicated with a ferromagnetic as shown in Fig.2. The temperature dependence of magnetization curve of sample with annealing in Ar/H₂(5%) atmosphere was measured from 60 to 350K. The temperature dependence of magnetization curve is indicated that the magnetic state is maintained to weak ferro-magnetic above the room temperature.

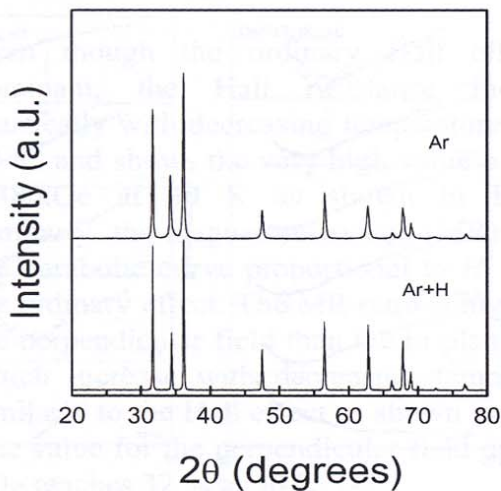


Fig. 1: The X-ray Diffraction Patterns as A Function of The Annealing Atmosphere Gas at Room Temperature.

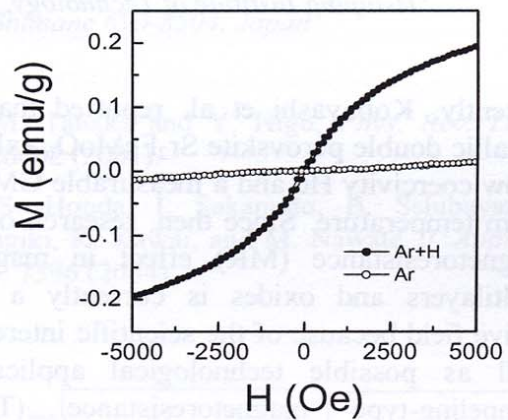


Fig.2: The Hysteresis Loops as A Function of The Annealing Atmosphere Gas at Room Temperature.