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Fe-doping effects of ferromagnetic $\text{Zn}_{0.98-x}\text{Fe}_{0.02}\text{Mg}_x\text{O}$ semiconductor

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Abstract

The X-ray diffraction patterns of the $\text{Zn}_{0.98-x}\text{Fe}_{0.02}\text{Mg}_x\text{O}$ ($x = 0, 0.05, 0.1, 0.2$) powders showed no detectable MgO peaks for $x \leq 0.1$, whereas clear MgO peaks $x = 0.2$. All the peaks for the X-ray diffraction patterns of $x \leq 0.1$ samples belong to the hexagonal ($P6_3mc$) lattice of ZnO. The hysteresis curve at 77 K for the $\text{Zn}_{0.88}\text{Mg}_{0.1}\text{Fe}_{0.02}\text{O}$ indicated the coexistence of both a paramagnetic and a ferromagnetic phases. The temperature dependence of magneto-resistance curve shows semiconductor behavior over 220 K.

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