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Paramagnetic properties of Mn^{2+} in Mn-added ZnO[1] S. H. CHOH, KBSI, I.-W. PARK, Y. M. KIM, C. H. SON, KBSI, J. H. LYOU, Korea University, Y. J. PARK, KIST, U. CHON, RIST — Spin injected semiconductors, in which spins are introduced into the lattice, have been intensively studied due to their wide potential applications. Ferromagnetic ordering above room temperature in some of Mn-added ZnO was theoretically predicted by Dietl et al [1] and experimentally observed in Mn-doped ZnO [2]. In this work, we report the electron magnetic resonance (EMR) studies as well as physical properties of $Zn_{1-x}Mn_xO$ (x = 0.005 - 0.20) powders and a thermally Mn diffused ZnO crystal at 1000 °C. The crystal structure of all samples showed a hexagonal wurtzite. However, even for the lowest Mn content (x=0.005) the samples turn out to contain a secondary phase [3], $ZnMn_2O_4$, from the XRD pattern. As the Mn content in the samples increases, so does the concentration of the secondary phase. In addition the electron magnetic resonance signal intensity of the paramagnetic Mn^{2+}, successfully incorporated into ZnO powder, decreases as the incorporated Mn content increases. This means that the Mn-rich secondary phase can more easily be formed than the Mn incorporated ZnO powder at 700 °C. Paramagnetic Mn^{2+} ions in a Mn-diffused ZnO crystal are turned out to sit on the Zn site from the EMR spectra. [1] T. Dietl et al, Science 287, 1019 (2000). [2] P. Sharma et al, Nature Materials 2, 673 (2003). [3] Y. M. Kim et al, Solid State Comm., 129, 175 (2004).

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