

Growth of ultrafine Co–Mn ferrite and magnetic properties by a sol–gel method

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Ultrafine $\text{Co}_{0.9}\text{Mn}_{0.1}\text{Fe}_2\text{O}_4$ particles are fabricated by a sol–gel method. Magnetic and structural properties of powders are investigated with x-ray diffraction, vibrating samples magnetometer, and Mössbauer spectroscopy. Co–Mn ferrite powders which were fired at and above 673 K have only a single phase spinel structure and behave ferrimagnetically. Powders annealed at 673 K have a typical spinel structure and the paramagnetic and ferrimagnetic nature, simultaneously. The formation of nanocrystallized particles is confirmed when Co–Mn ferrite is annealed at 623 K. The magnetic behavior of Co–Mn ferrite powders fired at and above 823 K shows that an increase of the annealing temperature yields a decrease of the coercivity and an increase of the saturation magnetization. The maximum coercivity and the saturation magnetization of Co–Mn ferrite powders are 1523 Oe and 66.7 emu/g, respectively. ^{57}Fe Mössbauer spectra of Co–Mn ferrite have been taken at various temperatures from 13 to 850 K. The isomer shifts indicate that the valence states of the Fe ions have a ferric character. © 1999 American Institute of Physics.

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