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Effect of argon annealing method on structural and ferromagnetic properties in Fe-doped SnO2 powders

Nanocrystalline powders of Fe-doped SnO2 (x = 0.00, 0.01, 0.03, 0.05) were synthesized by hydrothermal method. The powders were calcined in argon atmosphere at 600 oC for 2 h, phase transition from diamagnetic and weak ferromagnetic behavior to a ferromagnetic state. No trace and other magnetic impurity phase was detected in the samples with Fe content up to 3%. The magnetic properties of the calcined samples of Fe-doped SnO2 exhibited ferromagnetic behavior at room temperature with highest magnetization values of 22.54, 383.47 and 434.07 memu/g at 15 kOe for x = 0.01, 0.03 and 0.05, respectively. The room temperature ferromagnetism of samples originate from oxygen vacancy that occur in the argon annealing process. In particular, oxygen vacancy is a significanc role in ferromagnetic coupling corresponding to F-center interaction.

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