

Sol-Gel Synthesis of LaMnO₃ and PVA Effect on the Magnetic Properties

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Lanthanum-based perovskite-type oxides (LaMO₃) containing transition metals (M = Cr, Mn, Fe, Co, Ni, Cu), are well known as functional inorganic materials having wide applications such as electrodes for fuel cells, gas sensors, ion sensors, catalysts and various biomedical materials. LaMnO₃ has been reported to show interesting magnetic properties and also broad electric properties induced by oxygen vacancies. In this work we have successfully synthesis LaMnO₃ nanoparticle by sol-gel method, and investigated the effect of poly(vinyl alcohol) (PVA). La and Mn precursor dissolve in mixing solvent of acetic acid + methanol with a ratio of 4:1. After get clear and spinnable precursor solution, 6 wt% PVA with different volume (0, 5, 10, and 15 ml) was added. The final product was obtained by annealing at 700°C for 2 h. XRD spectrum show all the powder show cubic structure with particle size 20 ± 2 nm calculated using the Debye–Scherrer equation. The morphology of the LaMnO₃ nanoparticles became more porous with the increase of PVA volume in the reaction solution. Regarding the magnetic property, the assistance of PVA induced superparamagnetic behavior in the LaMnO₃ nanoparticles, which showed a weak paramagnetic characteristic when no PVA was used.