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Effect of Transition Metal (Fe, Mn) Ion Doping on TiO2 Nano Particles

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Abstract : In this research, we have studied the doping behaviors of two transition metal ion dopants on the crystal phase, particle sizes, XRD patterns, EDAX spectra, and photoreactivity of TiO2 nanoparticles. The crystalline size of TiO2 is close to 4 nm Calculated from (1 0 1) peak by using FWHM method in Scherrer's equation. Test metal ion concentrations ranged from 1% to 4 at.%, we report the growth of [Fe, Mn]xTiO2 nanocrystals prepared by Sol-Gel technique, followed by freeze-drying treatment at -30°C temperature for 12hrs. The obtained Gel was thermally treated at different temperature like 200°C, 400°C, 600°C, 800°C. Thermal gravimetric analysis (TGA) shows that dopant concentration affects thermal decomposition. The photoreactivities of transition metal ion-doped TiO2 nanoparticles under UV irradiation were quantified by the degradation of formaldehyde.

Keywords : growth from solution, sol-gel method, nanomaterials, oxides, magnetic materials, titanium compounds
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