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TITLE

Solid-state synthesis and applications of iron (III) oxide nanomaterials

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Thermally induced solid-state reactions present simple and cost-effective way how to synthesize ferric oxide nanostructures with a possibility to control their properties. Thus, ferric oxide nanopowder has been prepared by a thermal decomposition of ferrous oxalate dihydrate in air and tested as a catalyst in the decomposition of hydrogen peroxide and phenol degradation. Despite of a lower specific surface area, a nanocrystalline iron(III) oxides exhibited a higher catalytic efficiency contrary to amorphous iron(III) oxide. Sn-doped nanostructured □-Fe_2O_3 thin layers prepared by a thermally induced decomposition of ferric chloride hexahydrate in a presence of a doping agent have been found to be photocatalytically active as a semitransparent photoelectrode for water splitting. A rare ε-Fe_2O_3 currently deserves a significant attention due to a large room-temperature coercive field, magnetoelectric coupling and ferromagnetic resonance it exhibits. In case of its synthesis in high yields and without any other Fe_2O_3 polymorphs as admixtures, it would become as a perspective candidate for applications based on high coercivity materials and/or requiring coupled electric and magnetic material characteristics and/or involving the absorption of electromagnetic waves with wavelengths on the order of units of millimeters.

Biography

Libor Machala has completed his Ph.D. study of Applied physics in 2002 at Palacký University in Olomouc, Czech Republic. At the same university, he has been assistant professor from 2002 to 2010 and then associate professor at Department of Experimental physics. Currently he is also a leader of research group "Nanocrystalline metal oxides" in Regional Centre of Advanced Technologies and Materials, Palacký University in Olomouc, Czech Republic. He has published more than 25 papers in reputed journals and two chapters in books.