MICRO-MESOPOROUS IRON OXIDES WITH RECORD EFFICIENCY FOR DECOMPOSITION OF HYDROGEN PEROXIDE: MORPHOLOGY DRIVEN CATALYSIS FOR DEGRADATION OF ORGANIC CONTAMINANTS

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Abstract

A template-free solid-state synthesis of morphologically controlled and highly organized iron(III) oxide micro-mesoporous Fenton catalysts is demonstrated. The flower-like 3D nanoassembly of hematite nanoparticles (5-7 nm) exhibits the highest rate constant reported to date for the decomposition of H2O2 (1.43 × 10-1 min–1) with superior efficiency for degradation of aromatic (phenol, benzene, ethylbenzene) and chlorinated (trichloroethylene) pollutants in contaminated water. The morphological arrangement of nanoparticles apparently represents the key variable in heterogeneous Fenton-type catalysis.

Keywords: Micro-mesoporous materials, iron oxides, organic pollutants, Fenton reactions, hematite

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