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One-Pot Synthesis and Characterization of Platinum-Coated Magnetite Nanoparticles for Magnetosensitive Catalyst

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Recent catalyst advances in nanoparticle-based-core synthesis have enabled the precise control of the size, shape, and composition of noble metal nanoparticles, enabling their extended catalytic activity and outside acting force responsiveness. Here, we report the design of a magnetosensitive catalyst model that consists of magnetite nanoparticles with a Pt metal coating shell (Fe_3O_4@Pt NPs) in a one-pot-synthesis method. The fabrication of the nanocomposite catalyst was achieved by one-stage reduction of chloroplatinic precursor ions. Monodisperse Pt-coated nanoparticles with a size of *ca*. 50 nm have been characterized by transmission electron microscopy, high-resolution transmission electron microscopy, energy-dispersive spectroscopy, X-ray photoelectron spectroscopy, ultraviolet-visible spectroscopy and superconducting quantum interference device magnetometry. The Fe_3O_4@Pt NPs obtained under appropriate conditions without any surfactant possess a saturation magnetization of about 27.3 emu g^{-1} and demonstrate a good magnetic response that endows them with potential magnetosensitive catalysis application. Furthermore, the design concept used in the Fe_3O_4@Pt NPs magnetosensitive catalyst can be extended to other metal/metal oxide compositions.

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