Modified single-phase hematite nanoparticles: Synthesis, characterization and their application as the nanopigments

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Iron oxides are very important materials with three common forms: hematite, maghemite and magnetite [1]. Among them, hematite (α-Fe_2O_3) is the most stable under ambient conditions and the most environmentally friendly *n*-type functional material and semiconductor (e.g., 2.1 eV). Therefore, it has wide applications in many fields as the catalysts, electrodes, gas sensors, pigments, magnetic materials, clinical therapy and diagnosis *etc.* [2]. It is noted that the morphology and size of the α-Fe_2O_3 have a great effect on their chemical and physical properties. Much effort has been done in the design of the various α-Fe_2O_3 materials with a desired structure and morphology in the past decades [3]. In this research, single-phase α-Fe_2O_3 (hematite) nanoparticles have been successfully synthesized by a simple polymerizing-complaxing sol-gel method. The morphology and particle size of the products were investigated by scanning electron microscopy (SEM) and X-ray diffraction (XRD). Further, the products have been characterized by thermogravimetric analysis (TGA) and Fourier transform infrared (FT-IR) spectroscopy. The SEM images show that the particle size of as-prepared samples is from 20 to 40 nm (Fig. 1). The effect of the heat treatment on hematite phase evolution was also investigated. For the first time, these nanoparticles were used for preparation of a new anti-corrosive paint based on alkyd resins. The anti-corrosive property of the paint was studied by the electrochemical impedance spectroscopy.

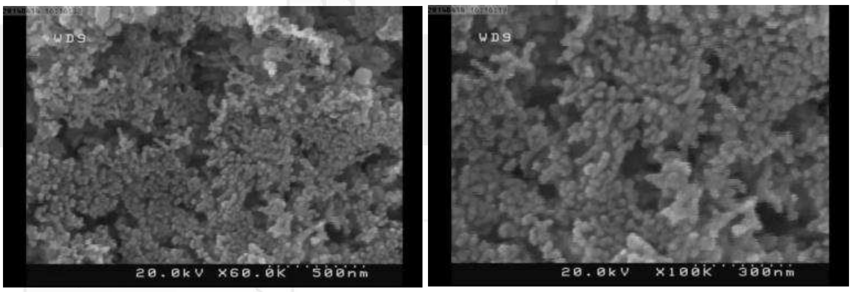

Fig. 1. SEM images of single-phase α-Fe_2O_3 (hematite) nanoparticles.

References:

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