Synthesis and characterization of vanadium pentoxidenanosheets and nanoparticles from oxovanadium phthalate complex

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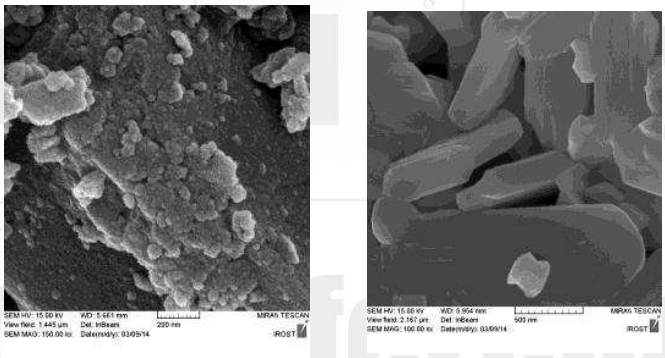
Three- dimensional (3D) and one-dimensional (1D) nanostructures such as nanoparticles, nanosheets, nanofibers and nanorabons shows huge potential of catalytic behavior because of their surface area and porosity [1,2]. Here in, we report the preparation of vanadium pentoxidenanosheets and nanoparticles with high surface area from oxovanadium phthalate by thermal decomposition method and their characterization by the field emission scanning electron microscopy (FE-SEM), X-ray powder diffraction (XRD), Brunauer-Emmett-Teller surface area analysis (BET), thermogravimetric analysis (TGA) and Fourier transform infrared spectroscopy (FT-IR).At first the oxovanadium phthalate complex, $VO(C_6H_4(COO)_2)_2$, was synthesized as a precursor from the reaction of hydrated vanadyl sulfate ($VOSO_4 \cdot nH_2O$) andphthalic acid ($C_6H_4(COOH)_2$). Then the vanadium pentoxidenanosheets and nanoparticles were prepared *via* thermal decomposition of oxovanadium phthalate complex.Thermal decomposition of oxovanadium phthalate complex was carried out at different temperatures (300-650°C) forvarioustimes (2-4 h) to find several morphologies[3]. These morphologies were characterized by FE-SEM (Fig. 1).The width of nanosheetsis about 50 nm and their length reaching up to 1-2 μm. The nanosheetsand nanoparticles were obtainedwhen the calcination was carried out at 650°C for 4 h to give 400 m^2/g surface area and 500°C for 2 h to give 750 m^2/g surface area, respectively. These vanadium pentoxide nanostructures are theperfect candidates for catalytic and electrochemical applications.



(a) (b)

Fig. 1.FE-SEM images of thevanadium pentoxide nanoparticles (a) and nanosheets (b).

References:

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