

Controllable synthesis of metal oxide nanostructures by self-assembled template

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Nanostructures of metal oxide have significant technological applications in nanoelectronics, optoelectronics, catalysis, data recording media, solar cells etc. A simple hydrothermal process has been adopted to prepare metal oxide of different forms as nanoparticles, nanorods and nanoflakes. The nanostructures have been characterized by X-ray diffraction (XRD), Energy Dispersive X-ray Analysis (EDX), and Scanning Electron Microscope (SEM). The synthesis was facilitated with the use of surfactant in aqueous solution which serves as self-assembled templates that helps to prevent agglomeration and the formation of nano-scaled materials. During preparation, the emphasis was given on the reaction condition i.e. concentration of reactants, temperature, pH, duration those are optimum for the formation mechanism. The effect of controlled presence of anionic and cationic surfactants was examined in the synthesis process to obtain a variety of nanostructured metal oxides. The influence of concentration of both precursor material and surfactants was found crucial for the morphological changes. The formation of nanomaterials can be attributed to the intercalation of the precursor ions in the interspaces between the head groups of surfactant having self-assembled structure that play the important role for growing nanomaterials with tunable morphology.

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