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Influence of citric acid on LiMn2O4 nanostructures prepared by modified chemical bath method

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LiMn2O4 powders were prepared by modified chemical bath method using citric acid solution (CA) a catalyst. The volume ratio (VR) of Li and Mn on LiMn2O4 was kept constant and the volumes of CA were varied. The effect of CA on structure, morphology and optical properties of LiMn2O4 nanostructures were investigated. The VR's of CA were varied from 1 mL≤ VR ≤120 mL. The X-ray diffraction (XRD) patterns of the LiMn2O4 nanostructures correspond to the various planes of a spinel LiMn2O4 phase. The diffraction peaks increase in intensity up to 40 mL of CA. The estimated average crystallite sizes calculated using the XRD spectra were found to be in the order of 63 ± 1 nm. It was observed that the estimated average crystallite sizes increases with an increase in CA up to 40 mL. The surface morphology study revealed the polygon shape. By varying CA solution morphology changed from polygon to irregular shape. The UV-Vis spectra showed a red shift with an increase in the amount of CA. The band gap energy of LiMn2O4 was also found to decrease. The best VR of CA on LiMn2O4 nanopowders were obtained at Li:Mn:CA ratio of 1:1:4. Lithium ion batteries are widely used in portable equipment, such as mobile phone, notebook computer, electron instrument, and so on.

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