

SAIP2014



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Phase evolution of vanadium oxides obtained through temperature programmed annealing of ammonium vanadate in hydrogen atmosphere

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Abstract :

The possibility of obtaining vanadium dioxide (VO_2) [wherein the vanadium ionic state is $4+$] from a precursor of ammonium metavanadate (NH_4VO_3) bearing the ion V^{5+} is investigated. The reduction is carried out by annealing the NH_4VO_3 powders in similar concentrations of H_2 flow at varying temperatures. The resulting powders have been studied by several techniques including X-ray diffraction (XRD), Raman spectroscopy, Fourier transform infrared spectroscopy (FTIR), Transmission electron microscope (TEM), Brunauer-Emmiller-Teller (BET) and Differential scanning calorimetry (DSC). It is found that remnants of bright yellow V^{5+} still exist up to annealing temperatures of 100°C after which the sky-blue VO_2 dominates at annealing temperatures of 150°C to 250°C . There is a population surge of metastable dark-blue V_6O_{13} (where V is in between V^{4+} and V^{5+} ionic states) between 250°C and 300°C . However above 350°C the material reverts to the stable V^{5+} in the yellow-orange V_2O_5 .

Award :

Yes

Level :

MSc

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Paper :

NO

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