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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 content
   (Max 300 words)
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The possibility of obtaining vanadium dioxide (VO2) [wherein the vanadium ionic state is 4+] from a precursor of ammonium metavanadate (NH4VO3) bearing the ion V5+ is investigated.
The reduction is carried out by annealing the NH4VO3 powders in similar concentrations of H2 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-Emmiter-Teller (BET) and Differential scanning calorimetry (DSC). It is found that remnants of bright yellow V5+ still exist up to annealing temperatures of 100 0C after which the sky-blue VO2 dominates at annealing temperatures of 150 0C to 250 0C. There is a population surge of metastable dark-blue V6O13 (where V is in between V4+ and V5+ ionic states) between 250 0C and 300 0C. However above 350 0C the material reverts to the stable V5+ in the yellow-orange V2O5.

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