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Controllable synthesis and characterizations of crystalline $Na_2V_6O_{15}3.0H_2O$ nanowires

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Recently, alkali-metal vanadium oxides bronzes have attracted much interest due to a wide range of application such eletrochromic devices, humidity sensor, etc. In addition, this is promising for the use of vanadium oxides as an effective catalyst for photocatalytic degradation of organic pollutants. The main objective of this work is study the synthesis of $Na_2V_6O_{15}3.0H_2O$ nanostructures using a “simple” and “clean” method. In a typical procedure, the mixed solution was prepared containing 0.06M of peroxovanadate with 12 ml of 0.1M NaOH solution. Then, this mixed solution was placed in a hydrothermal cell, which was maintained at 140°C for 24 h and then cooled in ice bath to room temperature. The brownish-red precipitate was dried at 50 °C for 24 h. X-ray analysis revealed the formation of $Na_2V_6O_{15}3.0H_2O$ nanoparticles. The water content in the synthesized products was confirmed by Thermal Gravimetric Analysis. The Transmission Electron Microscopy shows that obtained products have a uniform wire-like morphology with around 25nm of width and 5-15μm of length.