Synthesis of Vanadium Dioxide from Waste VRFB Electrolyte

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Recently, vanadium redox flow batteries (VRFB) have received attention as a large-scale energy storage technology for intermittent renewable energy sources. VRFB are considered especially attractive, since the electrochemically active reactants are vanadium species in four different oxidation states in both electrolyte solutions. However, even though the VRFB technology has several advantages over the conventional Li ion or lead acid batteries, high capital cost is one major challenge for the widespread deployment of VRFB's. The high cost of these systems can be attributed to the use of expensive vanadium. On the other hand, vanadium is used as a catalyst and semiconductor-to-metal. Therefore, recovery of vanadium from waste VRFB electrolyte has been required. Vanadium dioxide (VO_2) has attracted much attention because its semiconductor-to-metal transition temperature (Tc) is near room temperature (68 °C), which makes it useful for application to electrical and optical switching devices. In this work, recovery of vanadium from waste VRFB electrolyte was studied. And vanadium dioxide, which has potential applications in “smart windows” for energy saving, was synthesized by using recovered vanadium from waste VRFB electrolyte.