

Dimensionally Stable Anode as a Bipolar Plate for Vanadium Redox Flow Battery

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Abstract : Vanadium redox flow battery (VRFB) is a type of redox flow battery which uses vanadium ionic solution as electrolyte. Inside the VRFB, 2.5mm thickness of graphite is generally used as bipolar plate for anti-corrosion of current collector. In this research, thick graphite bipolar plate was substituted by 0.126mm thickness of dimensionally stable anode which was coated with IrO₂ on an anodic nanotubular TiO₂ substrate. It can provide dimensional advantage over the conventional graphite when the VRFB is used as multi-stack. Ir was coated by using spray coating method in order to enhance electric conductivity. In this study, various electrochemical characterizations were carried out. Cyclic voltammetry data showed activation of Ir in the positive electrode of VRFB. In addition, polarization measurements showed Ir-coated DSA had low overpotential in the positive electrode of VRFB. In cell test results, the DSA-used VRFB showed better efficiency than graphite-used VRFB in voltage and overall efficiency.

Keywords : bipolar plate, DSA (dimensionally stable anode), iridium oxide coating, TiO₂ nanotubes, VRFB (vanadium redox flow battery)

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