

Ce(III)/Ce(IV) as the positive half cell and V(II)/V(III) as the negative half cell of a redox flow battery

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The Redox Flow Battery (RFB) is one kind of the advanced rechargeable batteries, allows energy to be stored in two solutions containing different redox couples with electrochemical potentials sufficiently separated from each other to provide an electromotive force to drive the oxidation-reduction reactions. Hereby the all-vanadium RFB is a promising technology which could be economically viable. However, the open-circuit voltage for each single cell after full charging is about 1.4 V, which is relatively low. In this study, the Ce(IV)/Ce(III) couple, which has a standard reduction potential of 1.74 V, was investigated in order to assess its suitability as active species in the anolyte of a RFB because of its more positive standard electrode potential than the V(V)/V(IV) couple. The open cycle voltage of the Ce-V battery, the cell current efficiency, voltage efficiency and energy efficiency were tested and calculated.