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### Impedance characteristics of the all-vanadium redox flow batteries

Hong Sun, Dongxu Yu, Ruizhou Wang and Mingfu Yu  
Shenyang Jianzhu University, China

Although, all-vanadium redox flow battery (VRB) is very suitable for massive storage energy, its disadvantages such as low energy density, limited operating temperature and electrolyte solution imbalance, hinder its application. To improve the charge/discharge characteristics and AC impedance of single vanadium redox flow battery, a flow battery test system is developed and a single all vanadium redox flow battery is assembled in this paper. The charge/discharge performance and AC impedance of this assembled flow battery are measured by this test system. Equivalent circuit and equivalent resistance elements are investigated by using the equivalent circuit method and based on AC impedance spectroscopy of this all vanadium redox flow battery. The effects of current density, electrolyte solution flow rate and concentration on the charge/discharge characteristics and AC impedance are analyzed. These results show that the equivalent resistance elements of this flow battery consist of ohmic resistance in whole battery, Faraday resistance and capacitive reactance in both positive and negative electrode; the Faraday resistance of the positive electrode is more than that of the negative electrode; the increase of the electrolyte solution concentration increases the ohmic resistance and Faraday resistance, especially increases the Faraday resistance of the positive electrode.

#### Biography

Hong Sun has completed his PhD from Xi'an Jiaotong University, China. He is the Director of School of Transportation Engineering, Shenyang Jianzhu University, China. He has published more than 160 papers in reputed journals.

[sunhongwxh@sina.com](mailto:sunhongwxh@sina.com)

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