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**Novel graphitic carbon nitride nanosheets /sulfonated poly(ether ether ketone)  
acid-base hybrid membrane for vanadium redox flow battery**

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**Abstract**

Hybrid membranes (SPEEK/g-C<sub>3</sub>N<sub>4</sub>) composed of sulfonated poly(ether ether ketone) (SPEEK) and graphitic carbon nitride (g-C<sub>3</sub>N<sub>4</sub>) are fabricated via a solution-casting method for vanadium redox flow battery (VRB). The homogeneously dispersed g-C<sub>3</sub>N<sub>4</sub> into SPEEK matrix is demonstrated by FT-IR and SEM. The physicochemical properties such as swelling ratio, ion exchange capacity, proton conductivity, vanadium ion permeability, *etc.* coincide with the incorporated g-C<sub>3</sub>N<sub>4</sub>. SPEEK/g-C<sub>3</sub>N<sub>4</sub>-1.5 hybrid membrane exhibits a higher coulombic efficiency (CE: 97%) and energy efficiency (EE: 83.6%) at 30 mA cm<sup>-2</sup>, as compared with Nafion 117 (CE: 90% and EE: 73.8%) and SPEEK membrane (CE: 89.9% and EE: 76.1%). The self-discharge time of VRB with SPEEK/g-C<sub>3</sub>N<sub>4</sub>-1.5 (68 h) is longer than that of

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