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POS-39 An Organic Anode Enabling High Concentration and Cell Potential of An All-Organic Redox Flow Battery

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Redox flow batteries (RFBs), as large scale stationary energy storage systems, have attracted a lot of attention recently as a leading technology to enable integration of renewable energy with the power grid and thereby reduce CO2 emissions caused by the excessive use of fossil fuels. Most work on these systems are primarily based on metal complexes in aqueous electrolytes (limited potential window), or non-aqueous electrolytes (wider potential window). Most recently, a few metal-free systems have been investigated which employ organic materials as both catholyte and anolyte. Such systems offer the potential for reduced environmental load and low cost. Organic compounds with high redox potentials, which can be used for catholyte solutions, are readily available, but new anolyte materials based on organic compounds with low redox potentials are needed. In this work, an organic anode with a low redox potential and good solubility in non-aqueous electrolytes was designed and coupled with a high redox cathode to give an all-organic battery system with high energy density. Electrochemical testing of an all-organic non-aqueous redox flow-type battery employing 2,2,6,6-tetramethyl-1-piperidinyloxy and bispyridinylidene as cathodic and anodic active materials, respectively, will be discussed.

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