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A Quinone-Based Flow Battery for Large-Scale Electrochemical Energy Storage

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We report initial results from an aqueous quinone-bromine redox flow battery in which the negative electrode is a substituted quinone/hydroquinone couple and the positive electrode is bromine/hydrobromic acid. The redox active materials, which can be very inexpensive, contain no metals. Consequently, the cell appears to be a very attractive candidate for inexpensive, large-scale electrical energy storage. We will report the performance of a small flow battery based on this couple.

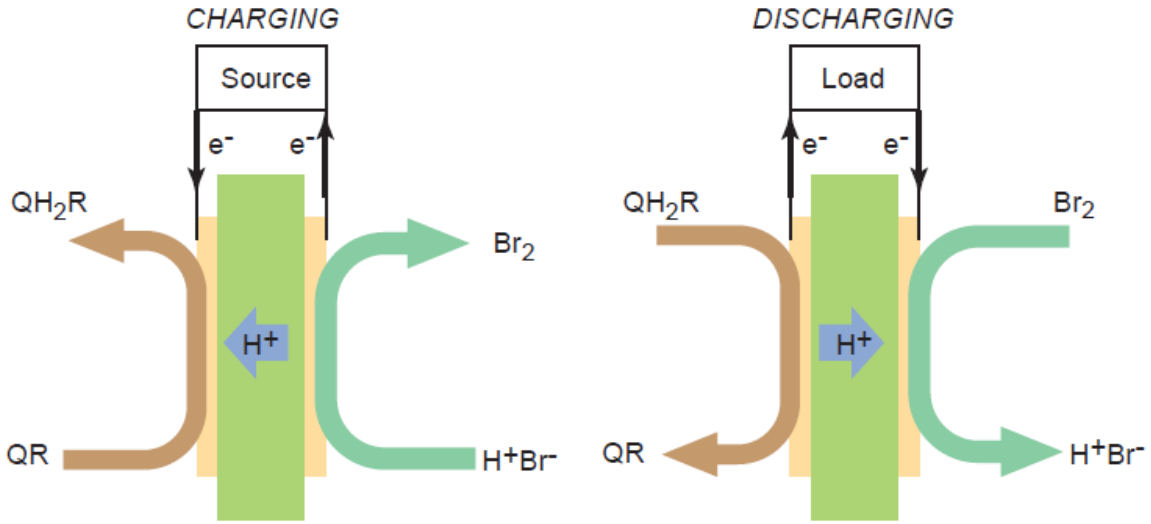

Figure 1. Cell schematic of a quinone-bromine flow cell upon charge and discharge.

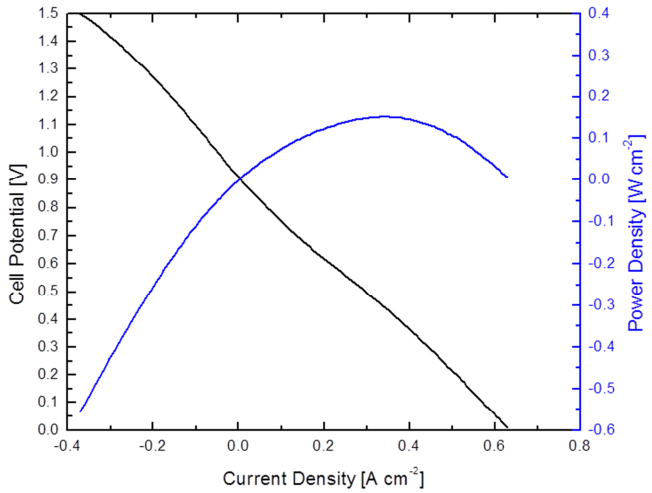

Figure 2. Cell potential and power density vs. current density for a quinone-bromine flow battery. The electrodes are Toray carbon paper with no electrocatalyst. The membrane is Nafion 212. The negative side is 1 M substituted quinone in 1 M sulfuric acid. The anode is 2 M hydrobromic acid.