

Redox Flow Battery Electrolytes

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The redox flow battery was first proposed in 1974 by NASA and has undergone development in various ways till the present. However there hasn't been much focus on the investigation of novel redox couples as suitable electrolytes for the system. A few electrolyte systems have undergone extensive testing, such as the all-vanadium battery at the University of New South Wales in Australia and the sodium bromide/sodium polysulphide system at National Power in the U.K., but none of these were commercialised till now. Our research focuses on the investigation of various novel electrolytes for potential applications in redox flow cells.

Both aqueous and non-aqueous systems were analysed by means of cyclic voltammetry and the general results pointed more favourably to organic redox couples. Under aqueous systems an all-chromium system was investigated extensively. A variety of organometallic redox couples were investigated in non-aqueous media as well.

Cyclic voltammetry results were used to scale up potentially promising redox couples for H-type glass cell tests. Favourable charge and discharge characteristics were obtained for the all-chromium redox system which prompted further investigations by means of a prototype flow cell. Non-aqueous redox couples are still under extensive investigation and their results shall be published shortly.

Key Words: Redox flow battery, redox couples, energy efficiency, non-aqueous electrolytes, charge and discharge characteristics, H-type glass cell, prototype flow cell.