RECHARGEABLE MAGNESIUM BATTERIES: ACHIEVEMENTS AND CHALLENGES

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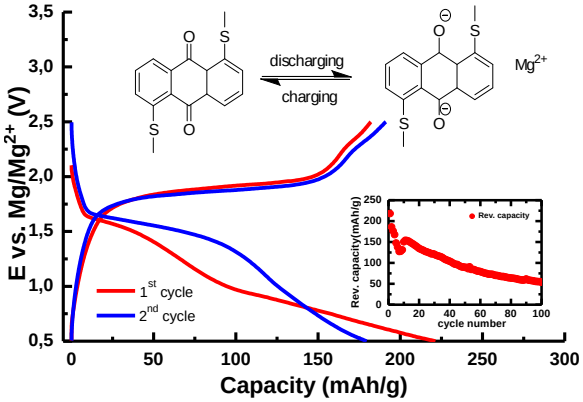
Mg batteries are currently considered as one of the possible next generation electrical energy storage devices since they have high theoretical energy density and Mg is also highly abundant and relatively cheap when compared to Li. Highly passivating nature of magnesium metal surface requires special attention to the electrolyte development which should go along with a development of active cathode materials. Recently a major progress has been made in the field of non-nucleophilic electrolytes with high oxidative stability.[1,2] This opened the possibility to employ these types of electrolytes with organic materials where weak intermolecular forces enable the reversible electrochemical interaction of Mg cations coupled with fast diffusion.[3,4]



In this contribution we demonstrate use of several different anthraquinone based polymers as an active cathode material which presents a robust approach towards sustainable Mg batteries with high power and good cycling properties. Redox active quinone groups in the polymer matrix together with Mg powder anode separated by non-nucleophilic electrolytes show excellent electrochemical activity and stability during cycling. All electrochemical tests were performed in the two electrode modified Swagelok laboratory cells. Capacities between 150 and 200 mAh/g at a voltage from 1.5 – 2.0 V with stability over 100 cycles are realistically obtainable in the system used in our work. The present results pave the way for the use of other organic active materials and the further development of electrolyte systems. In particular, by broadening the range of organic solvents used, we expect that even better stability and higher capacity of organic materials can be achieved.

Reference to a journal publication:

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