Einladung zum V O R T R AG

High energy, cost-effective and environmentally friendly supercapacitors using aqueous electrolytes

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Carbon/carbon capacitors in aqueous electrolyte can be charged up to 1.6 V by applying neutral aqueous lithium sulfate or sodium sulfate electrolytes. To enhance the energy of such system, we propose a dual-function electrolyte containing lithium sulfate (Li_2SO_4) and potassium iodide (KI) as voltage and capacitance enhancers, respectively, to approach the energy of an EDL capacitor in organic electrolyte. Owing to the presence of KI, polyiodides are confined in the porosity of the positive electrode, creating a hybrid capacitor, which exhibits a capacitance twice of its EDL counterpart. In order to extend the operation of this family of capacitors to low temperatures, methanol has been added to neutral aqueous electrolytes. The capacitors could operate down to –40 ºC, a temperature at which hydrogen storage in the negative electrode is quenched, and consequently self-discharge dramatically reduced. However, such electrolytes display a relatively low conductivity, which is not favourable for high power. Recently, we have circumvented this disadvantage by introducing aqueous electrolytes with eutectic properties which enable the capacitors to operate down to –40 ºC displaying high energy and high power.

- **Donnerstag, 20. Juli 2017**
- **16 c.t.**
- **HS H „Ulrich Santner“**

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