



Dienstag, 18.04.2017, 16.15 Uhr in W0 0-001

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## **Electrochemical characterization of electrolytes for an iron–iron(III) oxyhydroxide battery**

The increased use of renewable energies and the resulting daily imbalance between energy consumption and energy demand require worldwide more and more storage possibilities.

Since iron is a low priced, not dangerous and sustainable material, a battery based on iron offers great potential for environment-friendly energy storage. Up to now, batteries with one iron electrode already exist, for example iron-air-battery or iron-nickel-battery. For this type, both electrodes are based on iron. During charge on one electrode Fe is deposited and Fe(III)OOH on the other electrode and both are dissolved during discharge. The electrolyte contains Fe<sup>2+</sup> ions.

The biggest challenge so far is finding a stable electrolyte and at the same time increasing the efficiency. Measurements are performed in a three-electrode arrangement. For the working electrode a gold substrate is used, the counter electrode consists of steel. The potential is measured versus a silver/silver chloride reference electrode. For the electrolytes aqueous, non-toxic iron containing solutions with a neutral or slightly alkaline pH are prepared. For an electrochemical characterization cyclic voltammograms and charging/discharging cycles are recorded. The deposited iron(III) oxyhydroxide layers are characterized via profilometry and X-ray diffraction.