## Electrochemical investigation of TiO<sub>2</sub> anatase synthesized via different ways.

<u>P. Kubiak<sup>1</sup></u>, J. Geserick<sup>2</sup>, N. Hüsing<sup>2</sup>, R. Rosmanith<sup>3</sup>, K. Landfester<sup>3</sup>, and M. Wohlfahrt-Mehrens<sup>1</sup>

 <sup>1</sup>ZSW-Center for Solar Energy and Hydrogen Research, Helmhotzstraße 8,D-89081 Ulm, Germany
<sup>2</sup>University Ulm Department of Inorganic chemistry, Albert Einstein Allee 11 D-89081 Ulm, Germany
<sup>3</sup>University Ulm Department of Organic chemistry, Albert Einstein Allee 11 D-89081 Ulm, Germany

Lithium-ion batteries are an attractive power storage device due to their high energy density. Titanium dioxide is one of the promising candidates for the use as negative electrode in Li-ion batteries. Among its various crystal types, only the anatase and nanowires  $TiO_2(B)$ forms give satisfactory electrochemical performances [1,2]. The capacity of TiO<sub>2</sub> anatase is about 0.6 lithium ion at 1.78V vs Li<sup>+</sup>/Li [3]. But its electrochemical performance depends strongly on the size and shape of particles. Mesoporous materials are considered equally to be important in the energy storage aspects, as porosity plays an important role in the lithium insertion/extraction reactions [4-7]. Here, we investigate the electrochemical properties of three TiO<sub>2</sub> samples obtained via different synthesis.

The synthesis methods allow a large range of nanostructured functional materials. It is performed through two different ways: micro-emulsion and colloides self-organisation by condensation of inorganic species in presence of templates. Sample **a** has been obtained via micro-emulsion process. Two other materials have been prepared via sol-gel method in presence of a non-ionic (sample **b**) or an anionic surfactant (sample **c**). Figure 1 shows the SEM pictures obtained from these materials. Anatase structure was predominantly detected for the 3 materials by XRD, while BET specific surface areas were measured as being 150, 90 and 200 m<sup>2</sup>/g for samples **a**, **b** and **c** respectively.

The electrochemical evaluation is based on galvanostatic measurements using a voltage window of 1.2-3.2V. The electrolyte solution is 1M LiPF<sub>6</sub> in EC/DMC (1/1). We focus on the cycling behaviour and capacity evolution exhibited by these materials at charging rates from 2C to 6C (1C = 0.168 A/g). The capacity evolution is given on the figure 2.

The difference between the 3 studied materials in terms of capacity and stability and the relationships between porosity and electrochemical performances will be exposed and discussed.



**Fig 1:** SEM images of the 3 studied  $TiO_2$  samples.



Fig 2: Evolution of reversible capacities for the 3 TiO<sub>2</sub> samples at different charging rates (1C = 0.168 A/g).

## **References:**

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