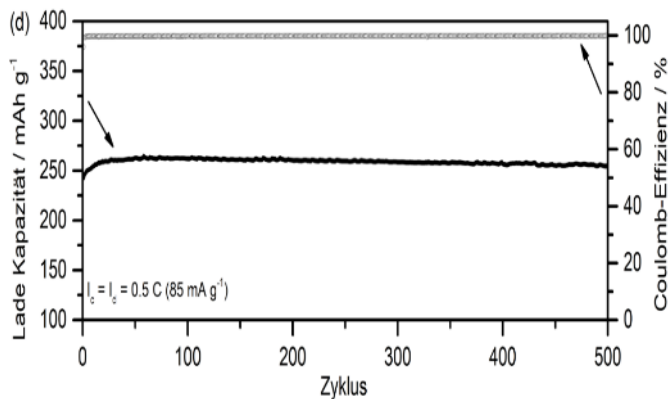


## TDTO (Three- Dimensional Titanium Oxide)

### Invention

The present invention belongs to the technical field of rechargeable batteries and supercapacitors. Particularly, it relates to an electrode material for rechargeable batteries and electrochemical capacitors, a method for preparing the same, and rechargeable batteries as well as electrochemical capacitors. Throughout the present invention a new three- dimensional (3D) TiO<sub>2</sub>/C architecture can be provided. In this

architecture, the primary TiO<sub>2</sub> nanoparticles are wrapped with Carbon, forming spherical secondary particles, and the spherical TiO<sub>2</sub>/C secondary particles further agglomerates with each other into a plate-like morphology.



Electrochemical performance of the anatase TiO<sub>2</sub>/C in a lithium ion cell

### Commercial Opportunities

Common strategies of the carbon coating always lead to serious phase separation or agglomeration of the TiO<sub>2</sub> nanoparticles, and a rather inhomogeneous distribution of the carbon coating, which results in relatively poor electronic conductivity and poor electrochemical performance. In addition to that, the construction of a three-dimensional TiO<sub>2</sub> nanostructure, and a more homogeneous carbon coating lead to an improved performance.

With the present invention, the energy density of rechargeable batteries (both lithium ion batteries and sodium ion batteries) and the power density of supercapacitors can be improved by the design of this architecture.

### Current Status

A German patent application has been filed. On behalf of the Wilhelms University Münster, PROVendis offers access to rights for commercial use as well as the opportunity for further co- development.

An invention of the Wilhelms University Münster and Forschungszentrum Jülich.

### Competitive Advantages

- Improved electrochemical performance
- Improved electronic conductivity
- Homogeneous carbon coating
- Higher energy density of super capacitors

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