Poly(vinylphenothiazine)-cathodes

Cathode materials for batteries and hybrid supercapacitors

Invention

The presented invention describes a composite electrode for lithium-ion or redox flow batteries made of organic material with very high cycling stability. For this purpose, poly(3-vinyl-*N*-methylphenothiazine) is used as cathode material in composite electrodes in batteries. In contrast to other organic cathode materials, the presented composite electrodes are characterized by a very high cycling stability and rate capability.

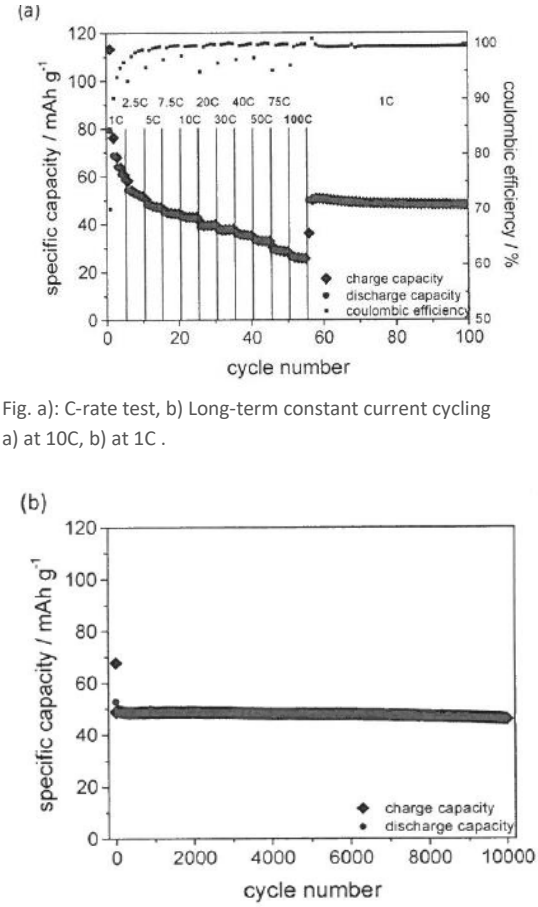

Fig. a): C-rate test, b) Long-term constant current cycling a) at 10C, b) at 1C .

Commercial Opportunities

Batteries deliver better energy densities than supercapacitors. However, supercapacitors can be charged/ discharged faster and more often. The invention lies in between these categories. Organic electrode materials have the potential for higher charging rates and a longer life compared to the materials used in commercial batteries. They also have higher energy densities compared to supercapacitors. Cathode materials are important building blocks in everyday life and can be found particularly in the field of printable electronics, hybrid capacitors for public transport (e.g. buses) or energy recovery. The invention can be used in many ways depending on the goals which are set. For example, battery manufacturers, manufacturers of electrode materials, or users of the finished battery/hybrid supercapacitors can benefit. The use of Poly(vinylphenothiazine)s as the cathode material enables longer battery life, fast charging and lower toxicity, which are significant economic advantages compared to existing metal oxide based materials.

Current Status

The invention was filed as a patent application with the DPMA. An International PCT Patent Application has been made as well.
A lab-scale prototype, including lab tests, has been successfully manufactured.
On behalf of the University of Muenster, PROvendis offers licenses to interested companies for the compounds and the process for their production.

An invention of the Westfälische-Wilhelms-University Muenster.

Competitive Advantages

- Metal free cathode
- Long-term stability
- Rate capability
- Sustainability
- Low toxicity
- Availability of raw materials
- Easy processing
- Lower costs
- Fast charging

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