Monomolecular Organic electrode material for energy storage

Fang Men, Zhiping Song, Jian Qin, Hui Zhan,
Department of Chemistry, Wuhan University, Wuhan, 430072, China

zhanhui3620@126.com

Organic material, as a rather new member in energy storage family, has attracted much attention and efforts because of its special property in many aspects comparing with other inorganic electrode material. In our recent study, different organic material has been investigated and used for non-aqueous secondary battery.

A series of quinone-based organics were investigated, through which the relation between the molecular structure and the electrochemical property was established. We found the molecular structure greatly influenced the cycling stability of the sample. If with appropriate conformation, even organic monomer could have very stable cycling stability.

In addition, highly conjugated monomer can better utilize the active site. For instance, anion doping and Li^+ association/de-association could both contribute capacity and more than 300mAh/g capacity could be continuously released. Detailed analysis indicated that the "size" of the monomer also played a big role, as it determined the conjugacy as well as the energy barrier between different LUMO. The subtle relationship could be evidenced by the voltage profile.

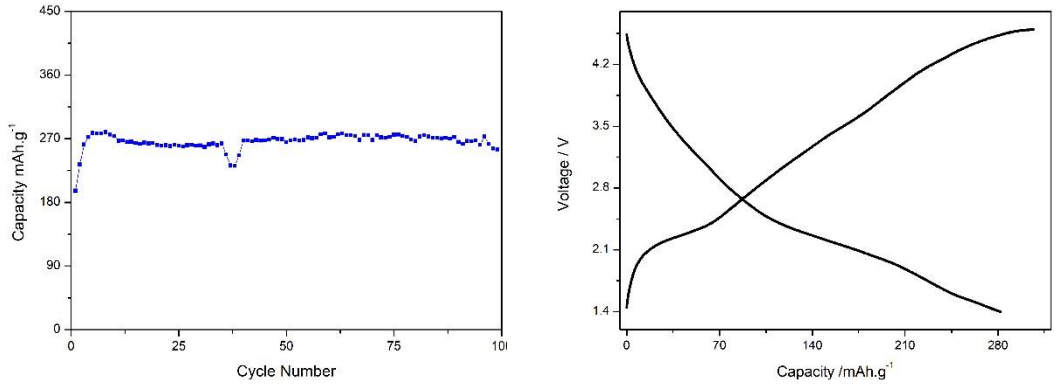

Figure. The cycling property and voltage profile of the organic electrode (1M $LiPF_6$ in EC+DMC, the current was 100mA/g)

In conclusion, organic material with multi-active site was proposed and owing to the synergy, high capacity was achieved, and the dependence of the electrochemical property on the molecular conformation was investigated in detail.