Mesoporous Lithium Titanate-Carbon Composite with Controlled Microstructure

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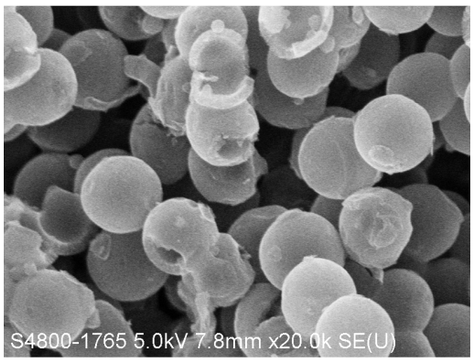
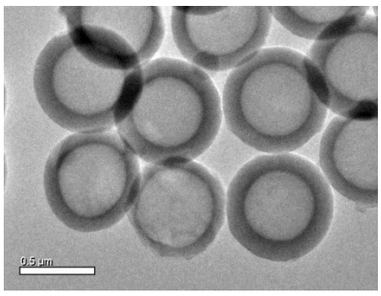
Lithium titanate, particularly $Li_4Ti_5O_{12}$ has attracted a great deal of attention recently as a promising anode material for lithium secondary batteries. [1-2] The high discharge rate performance is limited by the low electronic conductivity of the material ($< 10^{-11}$ Sm^{-1}), addition of carbon is one of the effective way in enhancing the rate performance. [3]

In this study, carbon with hollow core and mesoporous shells of controlled dimensions were fabricated via silica hard-template method. $Li_4Ti_5O_{12}$-carbon composites were built on top of these core-shells structures through impregnation of $Li_4Ti_5O_{12}$. These $Li_4Ti_5O_{12}$-carbon composites benefit from higher electronic conductivity, increased surface area of the active material and possibly length scale effect. By precisely control the structure of the mesoporous carbon core-shells in terms of diameter of core, thickness of the shell and diameter of the mesopores, the electrochemical behavior of mesoporous $Li_4Ti_5O_{12}$-carbon composite was optimized.





TEM and SEM images of the starting precursor – hierarchical core shell carbon.

Acknowledgement

This work was supported by Hong Kong Research Grants Council General Research Fund (HKU 700209P), Strategic Research Theme on Clean Energy, University Development Fund on Initiative on Clean Energy, and Innovation and Technology Fund of the Hong Kong SAR (ITS/076/11). Hoi Yung and Ching-Kit Ho were supported under internship schemes of the Innovation Technology Fund (ITS/076/11-InP/077/12 and ITS/076/11-InP/188/12).

References

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