Chemistry Seminar

Monday, 5 November 2018 at 16:15 in Room G3 Schrenk Hall

Electrode Materials for Li/Na-ion Batteries: Improving Electrochemical Performance Through Carbon Addition During Synthesis

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Lithium-ion batteries (LIBs) have outperformed other rechargeable battery systems since 1980 and advances in LIBs technology have improved living conditions around the globe. However, Li-ion batteries face many challenges and limitations. Na-ion batteries are considered to be an alternative to Li-ion batteries owing to the natural abundance of sodium. New electrode materials are required to increase the energy density of Li/Na-ion batteries. However, their electronic conductivity usually has to be improved through the preparation of composite powders ensuring intimate contact between the active material and conductive carbon. In this presentation, we report on the one-step synthesis of composite materials using spray-drying or hydrothermal synthesis routes, two techniques which are easily up-scalable[1-6].

In order to evidence the effect of the carbon on the microstructural and electrochemical properties of the prepared materials by a spray-drying [1-3] or hydrothermal methods [4-6]. The crystal and local structures were analyzed by combining XRD and ^{57}Fe Mössbauer spectroscopy. The morphological properties were characterized by SEM and TEM (**Figure 1**). The carbon content was determined by TG/TDA and carbon analyzer. The electrochemical properties were studied by impedance spectroscopy and galvanostatic cycling in lithium and sodium cells. The reaction mechanism during cycling was investigated by combining *operando* X-ray diffraction and ^{57}Fe Mössbauer spectroscopy.

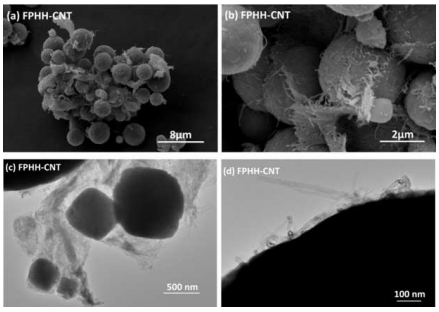

Figure 1. (a), (b) SEM and (c), (d) TEM micrographs of $Fe_{1.19}(PO_4)(OH)_{0.57}(H_2O)_{0.43}$/CNT composite material prepared by hydrothermal method [6].

References

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