

In situ Raman spectroscopic studied of anode materials for sodium ion battery

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The lithium ion battery is extensively used for many applications such as portable electronics, power tools, and large-scale energy storage systems. Although its outstanding electrochemical performance, LIB has some growing concerns about cost due to its limited reserves of raw materials. Sodium ion battery is considered an attractive alternative to lithium ion battery due to the lower price and abundance of sodium, and its similar intercalation chemistry to lithium.[1]

In order to characterize battery component, Raman spectroscopy has emerged as an important analytical technique because it can investigate the structure, local electrode composition and defects of battery component. However, ex situ Raman characterization has limitation because a practical battery system consists of active materials, electrolyte, binder, additives, and current collectors, and the charge/discharge reaction involves multielectron and multiphase processes. [2]

In this study, we fabricate the disordered carbon materials for sodium ion battery applications. For the investigation of chemical states and structural changes of carbon electrode, we prepare the in-situ electrochemical Raman system with a real battery cell. It shows changes of electroactive materials accompanying the electrochemical Na extraction and insertion of carbon electrode. The details will be discussed at the meeting.

[1] Verónica Palomares, Paula Serras, Irune Villaluenga, Karina B. Hueso, Javier Carretero-González and Teófilo Rojo, *Energy Environ. Sci.*, 2012, 5, 5884

[2] Jia-Jia Chen, Ru-Ming Yuan, Jia-Min Feng, Qian Zhang, Jing-Xin Huang, Gang Fu, Ming-Sen Zheng, Bin Ren, and Quan-Feng Dong, *Chem. Mater.* 2015, 27, 2048