PHOSPHATE-BASED MATERIALS AS PROMISING ELECTRODE MATERIALS FOR Li-ION BATTERIES

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ABSTRACT

In recent decades, energy production started to switch from fossil fuel burning to green renewable energy sources like solar, wind, and hydropower. The development of such renewable but intermittent energy requires improved energy storage technology. Among the energy storage technologies, lithium-ion battery (LIB), which after its commercialization in 1991 by Sony, rapidly became the most efficient storage alternative.
Although LiBs batteries is widely used in mobile (Electric vehicles; Laptops, Drones, Phones..) and stationary applications (Renewable energy), this technology is still facing many challenges including the safety concern.
To overcome this safety problem, the use of phosphate-based active materials in LiBs instead of the usual layered oxides is considered one of the useful approaches.
Here, we will present our recent R&D activities on the development of synthesis processes of phosphates and their test in Lithium-ion batteries. For instance, $Li_{0.5}Ni_{0.5}Ti_{1.5}Fe_{0.5}(PO_4)_3/C$ delivered reversible capacities of about 93% and 68% of its theoretical one at current rates of 0.1C (Discharge in 10h) after 100 cycles, and 5C (discharge in 12 min.) after 1000 cycles, respectively. Fig. 1 gives the evolution of the specific capacity upon cycling.

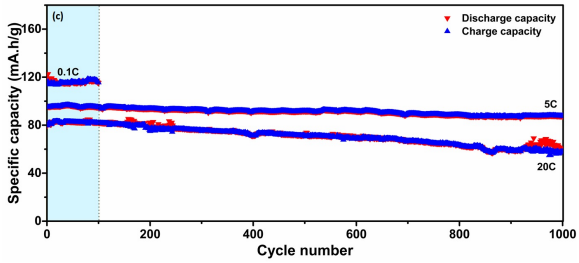

Fig. 1 : Specific capacity of the Li// $Li_{0.5}Ni_{0.5}Ti_{1.5}Fe_{0.5}(PO_4)_3/C$ battery

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