MESOPOROUS ANATASE TITANIUM DIOXIDE AS A LITHIUM INSERTION ELECTRODE MATERIAL

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Lithium-ion batteries are an attractive power storage device due to their high energy density. Anatase TiO_2 is one of the promising candidate for the use as negative electrode in Li-ion batteries. The capacity of TiO_2 anatase is about 0.6 lithium ion at 1.78 V vs. Li^+/Li. But its electrochemical performance depends strongly on the size and shape of the particles. Indeed, particles that are too small are handicapped by a strong charge irreversibility due to parasitic surface reactions. Mesoporous materials are considered equally to be important in the energy storage aspects, as the porosity plays an important role in the lithium insertion/extraction reactions. Here, we present some results obtained by using pure mesoporous TiO_2 anatase as positive electrode in Li//TiO_2 cells.

Mesoporous TiO_2 exhibits fast Li insertion/extraction capabilities (94 mAh/g at 30C, 55% of maximal capacity **Figure a**) with excellent reversibility and stability. Moreover, mesoporous sample shows unusual fast charging properties with excellent reversible capacities: 140 and 123 mAh/g at 20C and 30C charging rates respectively (**Figure b**) . The relationships between mesoporosity and electrochemical performances will be discussed.

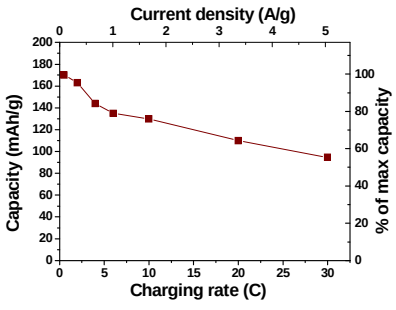

Figure a: Capacity evolution vs. charging rate (1C = 0.168 A/g)

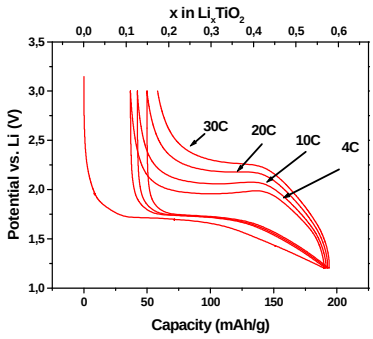

Figure b: Galvanostatic Li insertion/extraction into mesoporous TiO_2 with 4C in discharge and from 4C to 30C rate in charge