Synthesis and charge discharge properties of SnO_2 nanoparticles for Li rechargeable battery

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Recently, high capacity of lithium rechargeable battery has been demanded for high power mobile electronics. Tin oxide is one of promising anode materials for lithium rechargeable batteries instead of carbon or graphite and is in a considerable interest in worldwide.

We synthesized nano-size tin oxide (n-SnO_2) by colloidal method. Typically, the average size of the SnO_2 is about 2~3 nm. The analysis of the tin oxide was carried out by X-ray diffraction, transmission electron microscopy. Li-foil and tin oxide were used as positive and negative electrodes, respectively. The specific battery relevant properties on the SnO_2 were investigated in an organic electrolyte system. The properties of the SnO_2 and the irreversibility of the SnO_2 were investigated by cyclic voltammetry, cycler, and a.c. impedance spectroscopy.

Typical X-ray diffraction pattern of synthesized n-SnO_2 by colloidal method is given in Figure 1. Further, 2~3 nm-sized particles were confirmed by TEM (Figure 2). From the charge-discharge voltage profiles of n-SnO_2 at 1/16 CmA in 1M $LiPF_6$ (EC:DEC=1:1), it was found that n-SnO_2 showed better cyclability and capability than commercial electrode (SnO_2, ~45 μ). Details of improved cyclability and capability of nano-size particle will be discussed.

References

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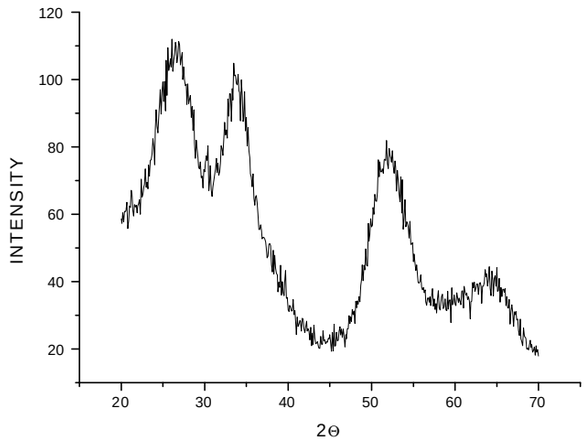

Figure 1. X-ray diffraction pattern of n-SnO_2.

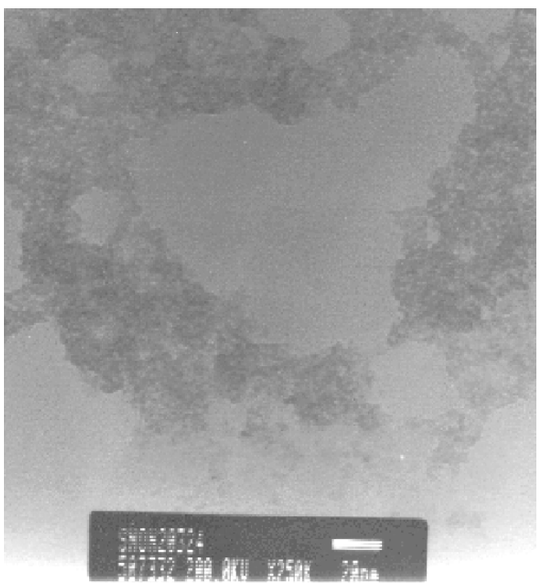

Figure 2. TEM photograph of n-SnO_2.