

Electrochemical and Thermal Behavior of Metal Coated Natural Graphite (MAG)

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The use of natural graphite material (MAG) might lower the cost of Li-ion batteries. But, exfoliation problem would occur due to the reaction between the graphite and solvent polyethylene carbonate (PC). Application of protective coating on MAG is hoped to offer solution to this problem. Therefore, electroless coating was applied to the MAG powder and the electrochemical and thermal properties were studied.

Experimental

Before the electroless plating, the MAG was cleaned using $K_2Cr_2O_7/H_2SO_4$ solution. The cleaned MAG was activated using $SnCl_2$ and $PdCl_2$ solution. And then, MAG was soaked in fresh bath solution every 2 hours (1-2). The sample was rinsed with distilled water before each step. SEM and TGA were run to confirm the existence and composition of copper.

The coated MAG was laminated with PVDF (8 wt%) and carbon black (3 wt%). The laminate was dried in vacuum oven. The electrolyte used in the experiment was 1 M $LiPF_6$ with PC/EC (6/4 in volume) solvent. After the cycling experiment, the DSC was run for the intercalated MAG.

Results

SEM/EDS picture for Cu coated MAG is shown in figure 1. The composition of copper is around 8 wt% after 3rd plating. In figure 2, the cycle behavior of Cu coated MAG was shown. Comparing to the severe exfoliation phenomena between PC and pure MAG, the copper coated MAG did work with PC as

solvent. But, exfoliation behavior can still be seen from plateau round 0.8 V during the charge/discharge process.

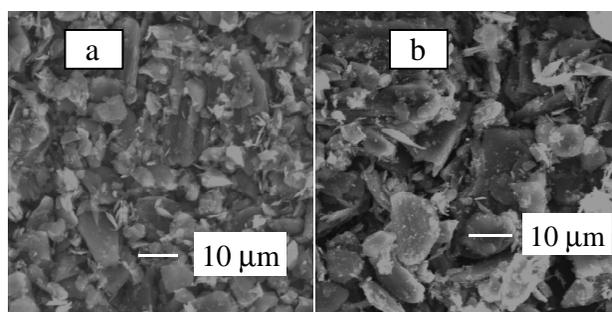
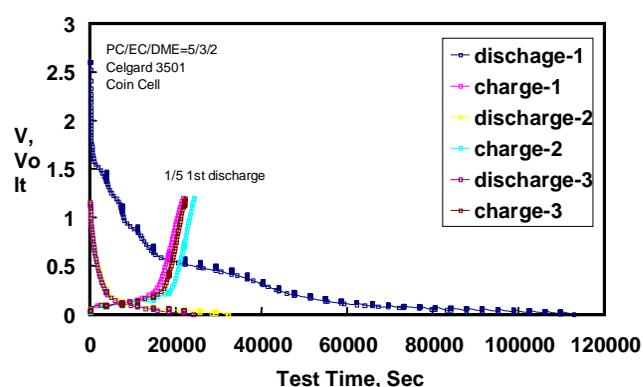


Fig. 1 (a) pure MAG, 95 % C, 5 % O; (b) cu coated MAG, 92 % C, 5% Cu, 3



% O.

Fig. 2 the cycle behavior of Cu coated MAG.

Acknowledgment:

The authors would like to acknowledge Argonne National Laboratory for the financial support.

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