Development of Lithium Ion Battery Nano-Synthesized Electrode Materials Using Fe3O4 and rGO

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Lithium-ion batteries are one of the most popular secondary batteries in modern society. Therefore, electrode materials are actively developed to increase the efficiency and stability of lithium-ion batteries. Fe3O4 and rGO(reduced graphene oxide) were used to develop nano-synthesized electrode materials. It was applied to lithium-ion batteries to test for efficiency and stability. First, rGO was made using graphene and synthesized with Fe3O4. Second, developed electrode materials in which nano-sized Fe3O4 was placed on rGO. Third, the made a coin cell type lithium-ion battery. Fe3O4/rGO were comparatively analyzed and experiments with commercial Fe3O4(Sigma-Aldrich). It was tested to x-ray diffraction pattern analysis, transmission electron microscope analysis, battery cycle performance experiments, and battery rate capability experiments. As a result of comparing commercial Fe3O4 with nano-synthesized electrode material Fe3O4/rGO, the initial theoretical capacity of commercial Fe3O4 was 600mAh/g~400mAh/g, the dose showed about 67% of the initial capacity. On the other hand, the initial theoretical capacity of Fe3O4/rGO was 1200mAh/g to 1000mAh/g, the capacity was about 84% of the initial capacity. Commercial Fe3O4 exhibits a low capacity of about 50mAh/g even at a fast charge/discharge rate of 2000mA/g. On the other hand, Fe3O4/rGO exhibits a high capacity of about 500mAh/g even at a fast charge/discharge rate of 2000mA/g. The nanostructures of Fe3O4/rGO revealed the potential of electrode materials to improve the efficiency and stability of lithium ion batteries by improving the reaction process of electrons and ions. Compared with commercial Fe3O4, Fe3O4/rGO showed excellent properties in terms of efficiency and stability.

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