High-rate-capability Graphene Oxide/Li₄Ti₅O₁₂-composite Anode for Lithium-Ion Batteries

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A graphene oxide/Li₄Ti₅O₁₂ (GO/LTO) composite was prepared with 1 wt% GO and 99 wt% commercial LTO by stirring at a high speed and then drying at a low temperature. Compared with pure LTO, the GO/LTO composite demonstrated higher charge capacity and better rate capability over 0-3 V. The charge capacities at 0.5, 1, 3, 5, and 10 C were 246.3, 234.0, 223.2, 220.6, and 214.1 mAh g⁻¹, respectively, for GO/LTO and 233.7, 218.7, 202.1, 190.5, and 148.5 mAh g⁻¹, respectively, for LTO. Furthermore, the GO/LTO composite retained 95.1% of the initial capacity after 200 cycles at a high rate of 5 C, which was considerably higher than that retained by the pure LTO (57.9%). The greatly improved electrochemical performance is attributed to an enhancement of lithium ion and electron conductivity caused by GO addition. GO acts as a binder, thereby improving the adhesive power of the electrode materials to the current collector. The electrode polarization is reduced and the electrolyte reduction decomposition is partially suppressed by adding GO. The process of preparing the GO/LTO composite is simple, low-cost and suitable for industrial use.

Keywords: graphene oxide, Li₄Ti₅O₁₂, composite, lithium-ion batteries

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