Facile one-step p-phenylenediamine assisted reduced graphene oxide-$Li_4T_5O_{12}$ nanocomposites for lithium battery application

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For high power lithium ion battery anodes, a novel electrode material with superior electrochemical performance is essential. Recently, Li4Ti5O12 (LTO) has been widely studied for an anode material of lithium battery electrode due to no structural changes and stable potential plateau at 1.5V. However, the electrical conductivity of LTO is very low (<10-3 S/cm) and decreased the performance at higher C rates. To improve the electrical conductivity of LTO particles, surface coatings by metal nanoparticles or carbonaceous materials such as graphene and CNT has been considered. Herein, we prepared the reduced graphene oxide-Li4Ti5O12 (RGO-LTO) nanocomposites by a facile one step reduction of GO/LTO suspension by p-phenylenediamine (p-PDA). The reaction of p-PDA oxidatively polymerized to poly (p-phenylenediamene), while GO/LTO reduced to RGO/LTO. The effect of reduction with addition of pPDA was systematically studied at varying pPDA/GO loadings. The reduction by pPDA significantly decreases the charge transfer resistance and exhibited the maximum rate capability at 2 wt.% loading of Poly (pPDA)-RGO.