

Preparation and Characterization of Graphene nanoplatelets/Polyacrylonitrile nanofiber for electrode materials via electrospinning

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The Graphene nanoplatelets(GNPs) is a nanoscale platelet composed of one or more layers of a graphene plain, with a platelet thickness from less than 0.34 to 100nm. GNPs have a range of unusual physical, chemical, and mechanical properties. The incorporation of nanoparticles into polymer matrix affords engineers an opportunity to synthesize polymer nanocomposites that potentially rival the most advanced materials in nature. To obtain well-dispersed GNPs in N,N-dimethylformamide(DMF), GNPs were ultrasonicated for 1hour in DMF using Tip-shaped ultra sonicator (0.01wt%, 0.05wt%, 0.1wt% and 0.5wt% relative to GNPs and DMF), and then Polyacrylonitrile(PAN) was added in dispersed solution. GNPs/PAN nanocomposites were carried out by solution mixing and using bath sonicator for 1 hour. The solution was fed into a positively charged spinneret attached to an electrospinning apparatus. The electrospun fiber was stablized in air at 280°C and then carbonized in atmosphere at 800°C. The GNPs/PAN nanofiber were characterized by scanning electron microscope and Transmission electron microscope. The electrochemical properties were also evaluated by cyclic voltametry and ac impedance.