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Flexible transparent and conductive films of reduced-graphene-oxide wrapped silver nanowires

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Abstract

A novel hybrid material based on silver nanowires (AgNWs) and reduced graphene oxide (rGO) wrapped network structure is prepared. AgNWs/rGO films are fabricated by simple filtrating a graphene oxide and AgNWs mixture solution which is well-dispersed in ethylene glycol with sodium dodecylbenzene sulfonate as a stabilizing agent. Compared to the single materials of rGO or AgNWs, the formation of this hybrid material has a low sheet resistance (15.33 Ω /sq) and high transparency (80.1% at 550nm). In addition, the hybrid AgNWs/rGO film prepared by a facile fabrication approach also shows a high flexibility and prominent stability, which is suitable for flexible electronics applications.

Keywords: Ag nanowires, reduced graphene oxide, flexible transparent conductive films, electrical properties, nanocomposites

Introduction

Recently, ITO has been widely used in electronics such as touch screen, solar cell, and organic light emitting diodes. However, ITO has many drawbacks such as brittleness and the growing cost of indium metal, which have caused restrictions in its applications. Nowadays, several materials including metal nanowire, carbon nanotube and graphene have been proposed for the purpose^[1-4]. Among these alternatives, graphene is the most promising substitute material for ITO due to its superior mechanical flexibility and excellent optical transparency as well as outstanding electrical properties.

The single layer graphene is usually synthesized by chemical vapor deposition (CVD) which can produce large area graphene with well controlled growth parameters. However, it requires a long

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