

Silver nanowire - Graphene oxide hybrid transparent conductive thin film for high mechanical stability and flexibility

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Abstract

Silver nanowire (Ag NW) network film as transparent conductive electrode is a promising candidate for replacement of indium tin oxide (ITO) film. Also, this film is suitable as an electrode for organic photovoltaics (OPVs), organic light emitting diodes (OLEDs), flexible displays and touch panel. Flexibility and mechanical stability of nanowire films are still problematic to apply to the device. Graphene oxide (GO) could be easily synthesized through the controlled chemical oxidation of graphite. Oxygen functional groups render GO stable and induce homogeneous colloidal suspensions in aqueous and various polar organic solvents. The polar site of GO can induce a strong electrostatic interaction between it and the metal. In this study, we used GO for enhancing the adhesion between Ag NWs. Vacuum filtration process was firstly used to fabricate thin film with mixture of GO and Ag NWs of 50nm diameter. Next, by using welding process, we diminished the contact resistance of Ag NW network without other treatment. We characterized the physical properties of the NWs and transparent film before and after the compression process in terms of scanning electron microscopy (SEM), 4 point probe and UV-visible spectrometer.

References

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