
Development of PSS-free PEDOT transparent conductive film on Hierarchical Nanoporous Layer glass

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Abstract

Transparent conductive films are widely used in electrical products such as touch panel devices. Indium tin oxide (ITO) is a typical material for it because it has a good balance between its conductivity and optical transparency though containing a rare metal and being vulnerable to bending. Therefore, a conductive polymer without any rare metals and with excellent flexibility attracts attention as a substitute material for ITO.

Poly (ethylene-3,4-dioxythiophene) / poly (styrenesulfonic acid) (PEDOT/PSS) is one of the most featured conductive polymers with excellent in conductivity, transparency and chemical stability. PSS in the PEDOT/PSS composite not only solubilizes PEDOT in aqueous solution but also supplies conductive carriers to PEDOT. PSS, however, can reduce the conductivity of the composite because PSS molecule itself is not conductive.

In this work, we tried to develop a PSS-free PEDOT film in combination with a hierarchical nanoporous layer (HNL) glass as a substrate. PEDOT was polymerized in the HNL pores with a polymerization initiator of iron chloride (III) and a carrier dopant of benzenesulfonic acid. The obtained PSS-free PEDOT film on HNL glass exhibited high sheet conductivity with high optical transparency.

Keywords: conductive polymer, hierarchical nanoporous layer glass, transparent, PEDOT/PSS

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