

Effect of Surface-Modification of Indium Tin Oxide Particles on Their Electrical Conductivity

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Abstract : The present work reports an effect of surface- modification of indium tin oxide (ITO) particles with chemicals on their electronic conductivity properties. Examined chemicals were polyvinyl alcohol (nonionic polymer), poly(diallyl dimethyl ammonium chloride) (cationic polymer), poly(sodium 4-styrene-sulfonate) (anionic polymer), (2-aminopropyl) trimethoxy silane (APMS) (silane coupling agent with amino group), and (3-mercaptopropyl) trimethoxy silane (MPS) (silane coupling agent with thiol group). For all the examined chemicals, volume resistivities of surface-modified ITO particles did not increase much when they were aged in air at 80 °C, compared to a volume resistivity of un-surface-modified ITO particles. Increases in volume resistivities of ITO particles surface-modified with the silane coupling agents were smaller than those with the polymers, since hydrolysis of the silane coupling agents and condensation of generated silanol and OH groups on ITO particles took place to provide efficient immobilization of them on particles. The APMS gave an increase in volume resistivity smaller than the MPS, since a larger solubility in water of APMS providing a larger amount of APMS immobilized on particles.

Keywords : indium tin oxide, particles, surface-modification, volume resistivity

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