

All Water-Based Solution Process for Metallic Nano-Mesh for transparent heater

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Transparent conducting electrodes have attracted substantial attentions as an essential component of various optoelectronic devices. Recently, the grid-structured metal mesh electrodes are considered as highly efficient transparent electrodes that possess high optical transmittance while maintaining sufficient electrical conductivity and are suitable for flexible conductors with isotropic electrical conductivity. Here, we report all water-based solution process for the fabrication of highly transparent metallic nano-mesh prepared. The metal mesh electrodes were formed by silver enhancement on gold nanoparticles dip-coated on APTES pre-patterned substrates. The optical and electrical properties of the metal mesh electrodes can be finely tuned by varying surface concentration of gold nanoparticles and silver enhancement time. The smallest feature size of the metal mesh patterns is about 700 nm with a thickness of 80–100 nm. The transparent electrodes with the metal nano-mesh structure exhibit excellent electrical conductivity with a sheet resistance of 70 Ω /sq at a transmittance of 96.2%. Also, we successfully applied metallic mesh to transparent heater which records 240°C at 5V.