TT-P025

Fabrication of transparent conductive thin films with Ag mesh shape using the polystyrene beads monolayer

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Transparent conductive oxide (TCO) films have many disadvantages, such as rarity, possible exhaustion, process temperature limitations, and brittleness on a flexible substrate. In particular, as display technology moves toward flexible displays, TCO will become completely unsuitable due to its brittleness.

To address theses issue, many researchers have been studying TCO substitutes. In recent efforts, metal nanowires, conducting polymers, carbon nanotube networks, graphene films, hybrid thin films, and metal meshes/grids have been evaluated as candidates to replace TCO electrodes.

In this study, we fabricated the TCO film with Ag meshes shape using polystyrene (PS) beads monolayer on the substrate. The PS beads were used as a template to create the mesh pattern. We fabricated the monolayer on the flexible substrate (PES) with the well-aligned PS beads. Electrodes with Ag mesh shape were formed using this patterned monolayer. We could fabricated the Ag mesh electrode with the sheet resistance with 8 ohmΩ / □.

Keywords: polystyrene bead, TCO, Ag mesh