Properties enhancement of graphene and chemical reduction silver nanoparticles conductive inks printed on polyvinyl alcohol (PVA) substrate

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ABSTRACT

Inkjet printing of conductive ink on flexible substrates is emerging as an attractive technology for wide variety applications. In this study, graphene and silver nanoparticles (AgNPs) conductive inks were printed on polyvinyl alcohol (PVA) substrates by inkjet printer. Effect of different solvents, printing cycles and annealing time on the performance of conductive ink was investigated. Three different groups of solvents were used to prepare the conductive ink; deionized water (DI): ethylene glycol (EG): glycol (G), isopropyl alcohol (IA): ethylene glycol (EG): glyceol (G) and dimethylformamide (DMF): Ethylene glycol (EG): Glyceol (G). DMF: EG: G solutions produced conductive ink with higher stability, wettability and electrical conductivity compared to other conductive ink formulations. It was observed that increased of printing cycles (from 1 to 5) times and annealing time (from 0 to 30) min had increase the electrical conductivity. During stretching, graphene conductive ink on PVA substrate shows lower electrical conductivity reduction compared to that of AgNPs conductive ink. Flaky shape of graphene able to maintain the conductive paths under loading condition.

KEYWORDS

Conductive ink; Inkjet printing; PVA; Electrical conductivity

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