Preparation of Electroless Copper Circuit on Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS) Using a Laser curing of Pd complex

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A laser selective metallization on polycarbonate/acrylonitrile butadiene styrene (PC/ABS) substrates has been developed to fabricate copper patterns in this research. A laser curable Pd complex consists of 4-Vinylpyridine (4VP), trimethylolpropanetriacrylate (TMPTA), tert-butyl peroxybenzoate (TBPB) and Pd(OAc)₂, is utilized. First, liquid-phase palladium complex deposited on flexible substrates is irradiated by the laser beam. This produced a cured Pd complex with an effective catalytic activity. Then, a copper layer can be selectively deposited in the laser activation area on the PC/ABS substrate to form a copper pattern with excellent adhesion by electroless deposition (ELD). Various laser curing parameters, including laser mode (continuous or pulsed), laser energy and laser wavelength, are investigated to elucidate their effects on the morphology of copper pattern and the adhesion between the copper layer and PC/ABS substrate. The copper coating plated in this way shows low resistivity, which can make the bulb bright and not peel off after testing the adhesion with 3M 600 tape. Moreover, we also demonstrate that the copper patterns can be prepared easily by laser-curing catalyst pattern, with electroless copper deposition, which is a fast and effective strategy for fabricating circuit patterns on the PC/ABS substrate.

Keywords: laser direct writing, catalytic ink, metal deposition, Copper circuit, PC/ABS

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