Inkjet Catalyst Printing and Electroless Ni-P Deposition for Fabrication of WWAN Antenna on PC/ABS Substrate

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In this study, a method to fabricate WWAN antenna on a PC/ABS alloy substrate is described. This method involves inkjet printing of a thermo-sensitive St-co-NIPAAm/Pd nanoparticle-based ink on PC/ABS substrate to create the catalytic site, onto which nickel is subsequently deposited by an electroless plating method, to obtain the desired metal pattern. Prior to electroless plating, pretreatments of PC/ABS by swelling and etching are utilized to improve the adhesion strength between PC/ABS substrate and electroless Ni-P coating. After the optimal swelling and etching treatments, the surface contact angle of PC/ABS decreases from 92° to 22° and the surface average roughness (Ra) increases from 329 to 2232 nm. The adhesion strength and corrosion resistance of the electroless Ni-P deposit increases as the pH value of the plating bath decreases. The maximum adhesion strength, about 2.3 MPa, is obtained at a bath pH of 5. Our result also demonstrates that this procedure is successfully applied for fabricating WWAN antenna with desired resonant frequencies.

Keywords: Inkjet printing; Electroless plating; Metal patterns; Antenna; PC/ABS

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