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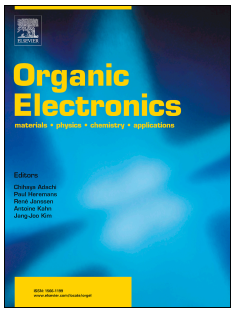

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Large-Scale Ultra-adhesive and Mechanically Flexible Silver Grids Transparent Electrodes by Solution Process

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Abstract

Metal grids have great potential in flexible transparent electrodes (FTEs) due to the high transmittance and conductivity. In addition, mechanical characteristic and adhesion are also crucial issues for commercial application. Here ultra-adhesive and mechanically robust metal grids FTEs were fabricated by in-situ growth metallic silver (s-Ag) film on polydopamine (PDA) adhesive-aid poly(ethylene terephthalate) (PET) substrate and electrospun polyacrylonitrile (PAN) fibers mask assisted acid etching, consequently generating s-Ag grids@PDA/PET. Transfer-free silver grids mainly offer high conductivity whereas the powerfully adhesive PDA can supply the mechanical flexibility. The s-Ag grids@PDA/PET possesses superior mechanical robustness and maintains high conductivity under harsh conditions. Further, the brightness of light-emitting diode (LED) connected the large-scale (3×3 cm^2) s-Ag grids@PDA/PET is stable under continuously mechanical attack. A power conversion efficiency of 6.4% has been achieved for s-Ag grids@PDA/PET used as an anode in polymer solar cells with 1.01 cm^2 effective area, which is comparable to the commercialized ITO/PET electrode. These results show that s-Ag grids@PDA/PET