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Superhydrophobic-Electrochromic PEDOT/PFHP Bilayer Surfaces

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ABSTRACT

Firstly, highly soluble perfluorohexyl substituted pyrrole polymer (PFHP) was synthesized by one-step reaction and characterized using spectral characterization techniques. Monolayer PFHP films were deposited on ITO-glass plates by dip and spin-coating techniques using the THF and DCM solutions. Bilayer PEDOT/PFHP films were prepared in two steps: 1) Electrochemical deposition of PEDOT layer on ITO-glass surface, 2) PFHP top layer coating on PEDOT layer by dip and spin-coating techniques. Experimental conditions in coatings were varied to optimize the surface properties like hydrophobicity. SEM-EDX analyses were carried out to determine the surface characteristics. Water and oil contact angles (WCA and OCA) were measured by Attention Theta contact angle meter. Deposition of PFHP solutions on ITO-glasses formed relatively flat surfaces having low WCA and OCA. Bilayer PEDOT/PFHP had highly porous surfaces and increased WCA values up to >170˚. The films prepared from DCM solutions had higher WCA values due to the formation of surface morphology. Electrochromic properties of superhydrophobic bilayer PEDOT/PFHP were also examined by spectroelectrochemical analysis. 20-25% of transmittance changes were obtained at two different absorption bands between the neutral and doped states.

Keywords: Electrochromism, superhydrophobic surfaces, multilayer surfaces.

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