

Growth mechanism of free-standing films on a vapour/water interface via vapour phase polymerization

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Free-standing PEDOT/PPy hybrid thin films were synthesized using the vapor phase polymerization technique. Through the spontaneous interface polymerization of the monomer vapours in the vapour/water interface of the oxidant in water, free-standing films were developed. These films were characterized by Fourier transform infrared spectroscopy (FTIR), Field Emission Scanning Electron Microscope (FE-SEM), and Energy-dispersive X-ray spectroscopy (EDS). FTIR spectra showed the presence of polypyrrole film at 1547, 1487, 1301 cm^{-1} , and of PEDOT film at 1048, 1187, 915, 926, and 678 cm^{-1} . Elemental analysis, by EDS, on the uppermost and lowermost surface of the sequentially polymerized EDOT monomer followed by pyrrole monomer has a nitrogen to sulfur ratio of 1.2 and 1.49 respectively. This suggests that more PEDOT fragments were stationed at the uppermost layer and PPy fragments at the lowermost layer. When the polymerization was reversed (pyrrole followed by EDOT monomer), opposite was observed. Results showed that a top down mechanism was observed during polymerization in the vapour/water interface.