Supplementary Material (ESI) for Polymer Chemistry

Supplementary Information

Gyroid Nanoporous Scaffold for Conductive Polymers

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Experimental

Materials. All other chemicals were received from Aldrich and used as received.

VPP of pyrrole. Fe(III)pTs solutions with concentration between 2.5% and 20% in ethanol were prepared. Nanoporous PB films were soaked in the Fe(III)pTs solutions for 30 min. When the films were taken out from oxidant solutions, the outside of the samples was washed with ethanol to remove excess Fe(III)pTs on the outside surface. The oxidant filled films were put into an oven at 80 – 100 °C to avoid crystallization of Fe(III)pTs before drying. After 5 min the solvent evaporated and the films became brownish. The films were then placed into a sealed chamber saturated with pyrrole vapors. After few minutes the color of the films changed from brown to black, indicating the formation of PPy. After 30 min the films were taken out of the vapor chamber and placed into a petri dish to dry in air for 30 min before they were thoroughly rinsed in ethanol. VPP of pyrrole on glass slides was performed by following the same procedure as described for nanoporous PB.

Characterization. Fourier transform infrared (FT-IR) and ultraviolet-visible (UV-Vis) spectra were measured at room temperature on SpectrumOne FT-IR and Lambda 5 UV/VIS spectrometers, respectively, both from PerkinElmer. Small angle x-ray scattering (SAXS) was done at Risø-DTU using Cu Kα x-rays with a wavelength of $\lambda = 1.54$ Å. Polypyrrole was characterized by Raman spectroscopy using a JOBIN YVON HR800 confocal Raman system with 632.8 nm diode laser

excitation on a 300 lines/mm grating at room temperature. Transmission electron microscopy (TEM) images were collected on a FEI TECNAI T20 operating at 200 kV, at the Center for Electron Nanoscopy at the Technical University of Denmark. Samples with 80 or 100 nm thickness were prepared on a LEICA ULTRACUT microtome using a DIATOME diamond knife at room temperature. Electrochemical testing of the polypyrrole modified NPM was performed on an electrochemical hardware system consisting of an EG&G PAR 363 Potentiostat/Galvanostat, a MacLab 400 with Chart v. 3.5.7/ EChem v.1.3.2 software (AD Instruments). The cyclic voltammetry was carried out at room temperature in a three-electrode cell, using PPy/NPM as the working electrode, Platinum mesh and Ag/AgCl as the auxiliary and reference, repectively. The thickness of PPy coating on glass slides was measured by a DekTak profilometer.

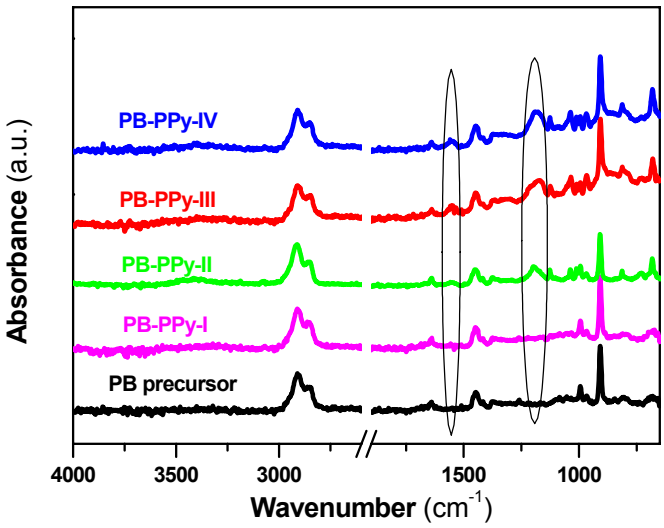

Figure S1 FT-IR spectra of PB precursor, PB-PPy-I, PB-PPy-II, PB-PPy-III and PB-PPy-IV.

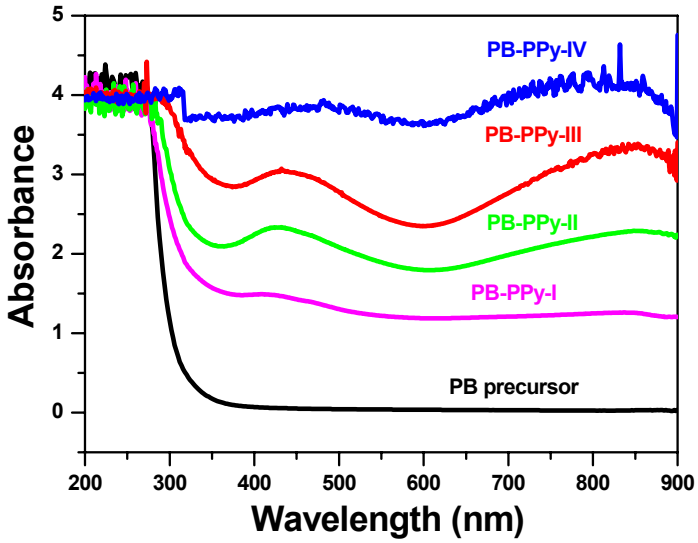

Figure S2 UV-Vis spectra of PB precursor, PB-PPy-I, PB-PPy-II, PB-PPy-III and PB-PPy-IV.