Conductometric hydrogen gas sensors based on templateless electrodeposited polypyrrole nanowires

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Nanostructured conducting polymers and their nanocomposites are considered attractive materials for gas sensing due to their high surface to volume ratios and room temperature operation [1,2]. Template-free controllable deposition of polypyrrole (PPy) nanowires can be achieved through electropolymerization [3]. In this work, PPy nanowires were electrodeposited on conductometric interdigitated transducers and characterized with scanning electron microscopy (SEM) as shown in Fig. 1. The electropolymerization of pyrrole monomer was conducted in a three-electrode electrochemical cell. The conductimetric transducer was used as the working electrode. The counter electrode was a platinum wire. Saturated calomel electrode (SCE) was used for the reference electrode. The polymerization solution contained 0.15 M pyrrole, 0.2 M Na_2HPO_4, and 0.002 M $LiClO_4$. The anodic potential was fixed at 0.85 V/SCE The sensors were tested towards different concentrations of H_2 gas, at room temperature (Fig. 2) [4].

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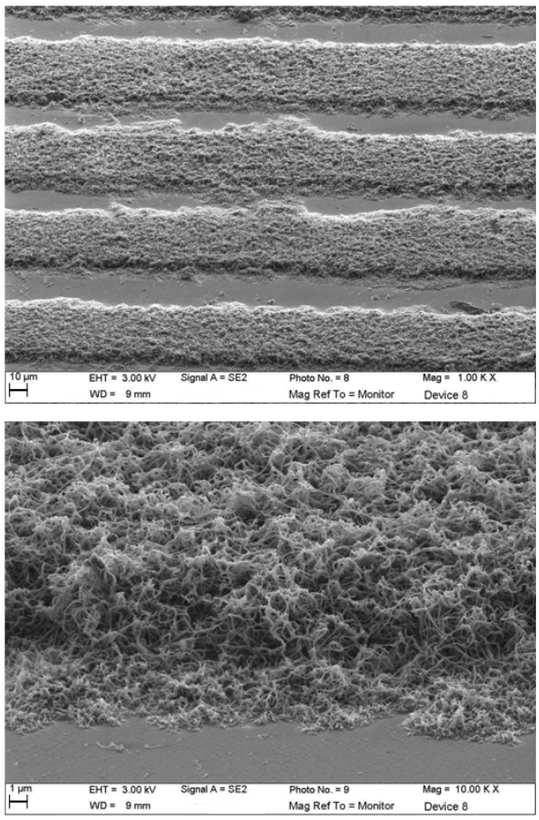

Figure 1: SEM images of a sensor surface.

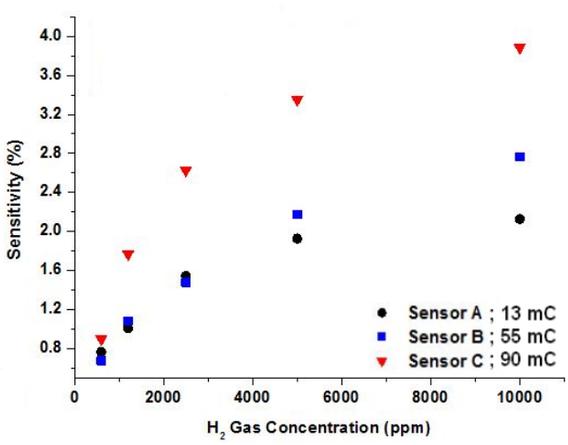

Figure 2: Sensitivities of various H_2 gas sensors. Anodic charge passes though the system during the PPy electrodeposition; 13, 55 and 90 mC.