Preparation and Optimization of 3-D Porous Polyaniline Hydrogel Electrodes for Electrochemical Applications

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Conducting polymer Hydrogels (CPHs) could provide 3-D interconnected electrical pathways, which can be beneficially applied to electrochemical devices such as bioelectronics, sensors and energy storage devices. One of the popular methods for CPHs synthesis is to form a 3-D network of conducting polymers with crosslinking agents. Aniline-based CPHs can be easily prepared by simple mixing process of aniline (monomer), ammonium persulfate (initiator) and phytic acid (crosslinker). Here, we investigate the effect of the composition, thickness of the film and drying time on the electrical properties of the resulting CPHs. It is confirmed that the synthesis composition affects the length of the polymer chains, resulting in change in the microscopic morphology, conductivity and capacitance of the CPHs. Finally, a prototype of a soft-supercapacitor is demonstrated based on the polyaniline CPH electrodes.