Small Scaffolds, Giant Possibilities: Studying the Electrochemical Properties of PEDOT: PSS Scaffolds

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Polymer scaffolds have been the focus of bioelectronics for the past decade due to the variety of viable applications. They can be used as conducting components of a larger mechanism or as a platform for cell cultures. The fact that there is no dedicated study of the electrochemical characteristics of poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS), a commonly used conducting polymer, provides an opportunity for further research. Therefore, the main purpose of this study is to perform several electrochemical characterization tests in order to identify electrochemical properties. These include open circuit potential, resistance, capacitance and the electrochemical stability of the scaffold under different concentrations of 3-glycidiloxypropyl (GOPS), divinyl sulfone (DVS) and 4-Dodecylbenzenesulfonic (DBSA). It was concluded that GOPS has a negative effect on the open circuit potential when added to PEDOT:PSS scaffolds. The batch with the highest GOPS concentration (3%) had the lowest range of Open Circuit Potential (OCP) which was 0.2 – 0.29V, followed by the batch with the middling concentration of GOPS (2%) that had an OPC ranging from 0.29 – 0.4 V. The last batch had the lowest concentration of GOPS (1%) and the highest range of OCP, 0.35 – 0.41.These results were indicative of the fact that GOPS, which is a cross-linker, blocks the charges from interacting with the potassium ferrocyanide electrolyte due to its insulating properties. This research will help expand the range of applications that PEDOT:PSS scaffolds can be used for and provide for a more efficient process.