Stretchable Electrochemical Sensor Based on Doped PEDOT for Real-Time Monitoring of Living Cells

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Stretchable electrochemical sensor has great advantages in real-time monitoring of cell mechanotransduction[1,2], however, it is still a great challenge for existing materials to be used for the fabrication of sensors with both high electrochemical activity and excellent mechanical stretchability. As a conductive polymer, PEDOT has good electrochemical performance, but the low fracture strain (~ 5%) prevents its direct application in the field of stretchable devices[3]. Herein, we report a PEDOT-based stretchable electrochemical sensor by co-doping ionic compound (bis(trifluoromethane) sulfonimide lithium salt, LiTFSI) and phthalocyanine cobalt (CoPc). LiTFSI could significantly improve the stretchability of PEDOT film with stable electrochemical response even in 50% strain (Figure 1A). CoPc endowed the sensor with excellent electrocatalytic activity to the oxidation of H_2O_2 (Figure 1B). Together, this proposed sensor is expected to be as a powerful platform for the real-time monitoring of ROS released during cell mechanotransduction.

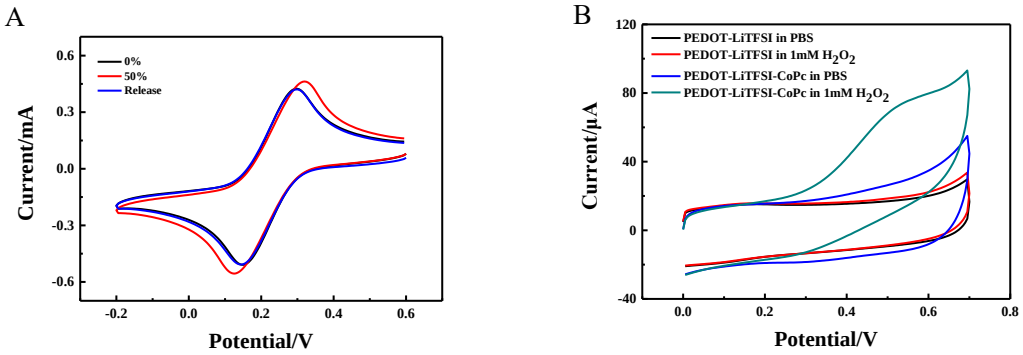

Figure 1: (A) Cyclic voltammograms of PEDOT-LiTFSI-CoPc/PDMS film obtained in 10 mM $K_3[Fe(CN)_6]$ before, after and recovering from being stretched to 50%. (B) Cyclic voltammograms of PEDOT-LiTFSI/PDMS and PEDOT-LiTFSI-CoPc/PDMS electrodes with and without 1 mM H_2O_2 in PBS solution.

References:

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