High-Performance Pressure Sensors with Graphene Nanoplatelets Embedded Fish-Scale Structured Polydimethylsiloxane Film for Full-Range Detection of Human Motions

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In recent years, wearable and flexible sensors have attracted great research interest and effort owing to their broad application prospects in wearable electronics, robotics, health monitoring, and so on. For practical applications, pressure sensors with high sensitivity and low cost are desired. Herein, we present a simple and low-cost method for fabrication of fish scale micro-patterned polydimethylsiloxane (PDMS) film via air/water interfacial formation technique. By integrating the uniform film of graphene nanoplatelets (GNPs), uniform and flexible pressure sensors can be constructed. Thanks to the unique fish scale structures of micro-patterned PDMS films, the obtained pressure sensor shows superior performance, a very low detectable pressure limit, a fast response time, and a high stability for the detection of feather-light pressures. The results indicate that the proposed pressure sensor is a promising cost-effective candidate for the future applications in monitoring human physiological signals, sensing subtle touch, and detecting spatial distribution of pressure, which may broaden their potential applications for diagnose.

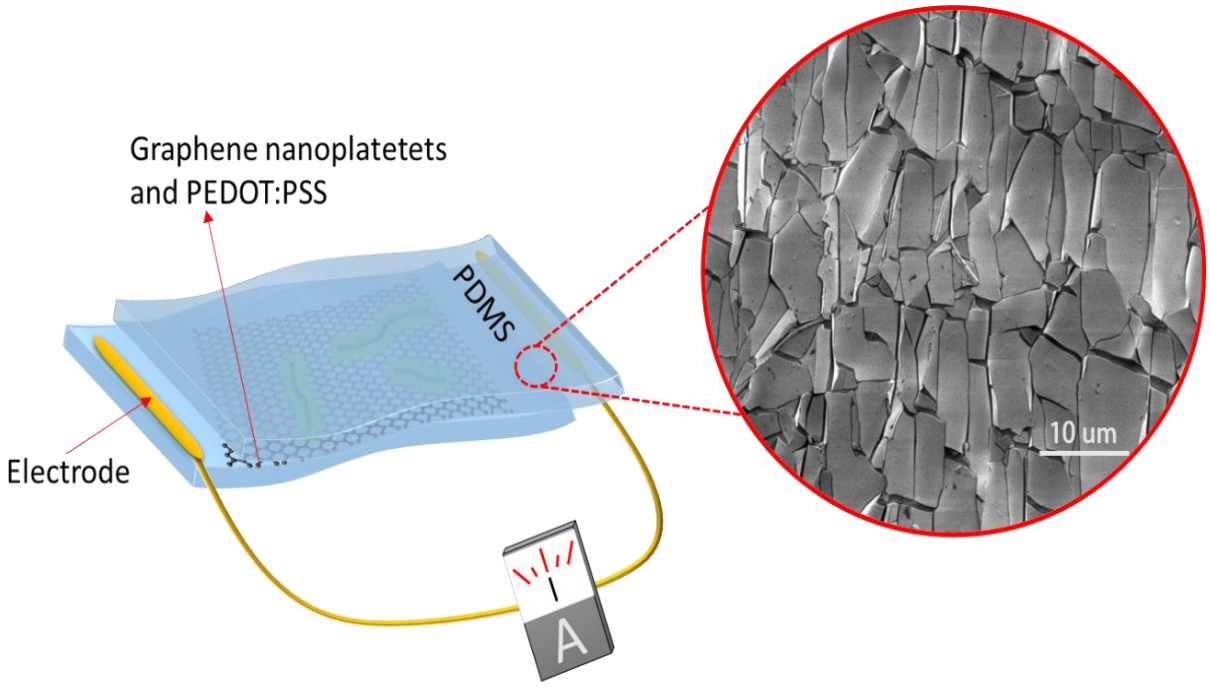

Figure 1. Schematic of a typical pressure sensor with fish-scale structured polydimethylsiloxane film