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Highly Stretchable, Intelligent and Conductive PEDOT/PU Nanofibers Based on Electrospinning and in situ Polymerization

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Abstract : A facile fabrication strategy via electrospinning and followed by in situ polymerization to fabricate a highly stretchable and conductive Poly(3,4-ethylenedioxythiophene)/Polyurethane (PEDOT/PU) nanofibrous membrane is reported. PU nanofibers were prepared by electrospinning and then PEDOT was coated on the plasma modified PU nanofiber surface via in-situ polymerization to form flexible PEDOT/PU composite nanofibers with conductivity. The results show PEDOT is successfully synthesized on the surface of PU nanofiber and PEDOT/PU composite nanofibers possess skin-core structure. Furthermore, the experiments indicate the optimal technological parameters of the polymerization process are as follow: The concentration of EDOT monomers is 50 mmol/L, the polymerization time is 24 h and the temperature is 25℃. The PEDOT/PU nanofibers exhibit excellent electrical conductivity (27.4 S/cm). In addition, flexible sensor made from conductive PEDOT/PU nanofibers shows highly sensitive response towards tensile strain and also can be used to detect finger motion. The results demonstrate promising application of the as-obtained nanofibrous membrane in flexible wearable electronic fields.

Keywords : electrospinning, polyurethane, PEDOT, conductive nanofiber, flexible senor
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