

Abstract Submitted
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Electro-spun PEDOT-PSS nano-ribbon transistor using ion-gel gate dielectric¹ DELIRIS N ORTIZ, NICHOLAS J PINTO, University of Puerto Rico at Humacao — Poly(3,4-ethylenedioxythiophene) doped with poly(styrenesulfonic acid)-PEDOT:PSS is a *p*-doped conducting polymer. Using the electrospinning technique, we have fabricated nano-ribbons of this polymer and deposited them on pre-patterned doped Si/SiO₂ wafers. Using the doped Si substrate as the back gate electrode and the SiO₂ as the dielectric insulator, the ribbon was characterized in a 3-terminal transistor configuration. No change in the channel current was observed for back gate bias under these conditions. We also used an ion-gel gate dielectric by placing a drop of the ion-gel over the ribbon and inserting a Au wire into the drop. By applying a bias to this contact (top gate), we were able to modulate the current through the ribbon at low voltages. The device operated like a field effect/electrochemical transistor, characteristic of a *p*-doped semiconductor with an on/off ratio of 350, threshold voltage of 0.7V, mobility of 5 cm²/V-s, and a zero gate bias conductivity of 15 S/cm. The large specific capacitance of the ion-gel (as compared to SiO₂) and the formation of an electric double layer at the semiconductor/ion-gel interface was responsible for its operation below 2V. The device was also successfully tested at 100Hz making it useful in low frequency applications.

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