Docket #: S15-248

Highly Conductive, Stretchable Polymer

Stanford researchers have developed a highly conductive, stretchable polymer that is durable enough for wearable electronics. To improve flexibility they doped poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS)with ionic liquid plasticizer. The plasticizer provides a fiber-like morphology, improves connectivity and conductively via the doping anions. The transparent doped PEDOT:PSS is stretchable to twice its initial length, and maintains conductivity on the order of 10^2 to 10^3 S/cm. The water based dispersion can be directly printed onto substrates, making it an excellent electrode or interconnect for wearable electronic devices.

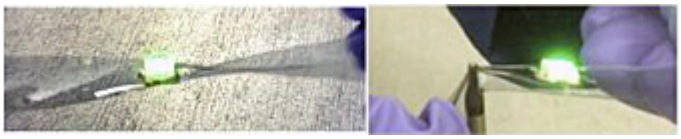

Figure 1 Photographs illustrating the minimal change in LED brightness as the device is stretched under twisting and poked with a sharp object, respectively.

Stage of Research
Researchers continue to test different ionic liquids and processing methods to optimize properties.

Applications

- Stretchable conductor for:
  - Wearable electronics / biomedical device electrodes and interconnects
  - Strain or pressure sensors
  - Stretchable battery electrodes

Advantages

- High conductivity - 3100 S/cm increases to > 4100 S/cm under strain due to chain alignment
- Excellent durability - conductivity maintained after 1000 cycles at 100% strain with fracture strain > 800%
- Low temperature sensitivity, making it an excellent interconnect
- Easy integration – directly printed and patterned onto substrates, compatible with organic semiconductor components
- Easy fabrication -commercially available, well characterized

Publications

- Wang, Y., Zhu, C., Pfattner, R., Yan, H., Jin, L., Chen, S., . . . Bao, Z, "A highly stretchable, transparent, and conductive polymer,"Science Advances, 3(3). doi:10.1126/sciadv.1602076

Patents

- Published Application: WO2017124020
- Published Application: 20180327543
- Issued: 11,499,007 (USA)

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