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Highly Conductive, Stretchable, Flexible Transparent Electrodes on Bio-polymer Substrates for Stretchable Electronics

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Stretchable electronic devices have received much attention due to its novel applications including stretchable, wearable displays, sensors, solar cells, light emitting skins, bio-metric devices, and human-interface devices. The development of transparent electrode is of importance to achieve high performance stretchable opto-electronics. ITO is the most widely used transparent electrodes in conventional opto-electronic devices, however it has inherent brittleness and needs high temperature process. Here, we investigate high performance stretchable transparent electrodes based on silver nano-wires as alternative electrodes to replace ITO with chitosan stretchable substrates. While PDMS is most widely used materials as a stretchable transparent substrate, chitosan has received much attention as a promising stretchable transparent substrate which is biodegradable, bio-compatible. The stretchable transparent electrodes on chitosan developed here show the high transmittance (88.9%), the low sheet resistance (12.2 ohm/sq), and excellent stretch-ability. The stretchable transparent electrodes are successfully adopted into AC-electroluminescence devices with ZnS: Cu phosphors.

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