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Wearable smart skin based on triboelectric nanogenerator and CdSe/CdS quantum rods for pressure and tensile sensing

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Over the past few years, wearable smart skin is one of the hottest research topics attracting worldwide attention. Since the birth of the triboelectric nanogenerator (TENG), which is originating from Maxwell's displacement current, the vertical pressure sensor function can be achieved easily without any external power supplies. However, to mimic human skin better, more functions need to be added into one simple device, especially the basic lateral tensile sensing ability.

In this work, we fabricate a new type of wearable smart skin based on TENG and luminescent effect for both vertical pressure and lateral tensile sensing. Polydimethylsiloxane (PDMS) based single-electrode mode TENG part gives the vertical pressure sensing ability to the whole device. In addition, CdSe/CdS quantum rods (QRs) are introduced into the device as a luminescent layer for lateral tensile sensing. Small angle neutron scattering (SANS) is used to investigate the CdSe/CdS QRs alignment in PDMS thick film under different tensile degrees (from 0% to 100%).

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