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Wearable Electronic Skin based on Triboelectric and Luminescent Effect for Pressure and Tensile Sensing

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Electronic skin (E-skin) as the medium between ambient environment and bionic robots is an advanced technology that provides an electronic readout or even produces a visualized response that can be easily captured for post-processing. Since this concept birth, different electronic skins have been fabricated and utilized for various sensing applications, such as pressure, humidity, temperature et al. However, to mimic human skin better, combining more sensing capabilities into one E-skin system is highly in demand.

In this work, we fabricated a new type of wearable E-skin system based on triboelectric and luminescent effect for both pressure and tensile sensing. This device consists of a PDMS-based single-electrode mode triboelectric nanogenerator as a pressure sensor and a luminescent layer for tensile sensing. Here, the luminescent effect is realized by adding CdSe/CdS quantum rods (QRs) into PDMS film, which can be excited under visible light. The sensitivity of the pressure sensor is enhanced by surface morphology. GISAXS/SAXS are used to characterize both the distribution of QRs and the surface morphology of PDMS film.

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