用于柔性可穿戴设备的薄膜式曲率传感器

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Abstrat：Flexible and wearable electronics integrated with various sensors have great potential for applications in monitoring human activities and personal health. Bending and tension/compression dominate the deformation modes yielded by flexure of joints and diverse body gestures. A key challenge now is to sense the curvature/bending angle, while much research has been focused on the strain sensors for tension/compression. Alternative approaches by strain sensors or non-contact optical methods for curvature sensing are not practical for wearable electronics, because the former demands perfect adhesion of the sensors to target surfaces (e.g., the human skin) and the latter requires complicated and bulky measurement systems that hinder their portability. Here, a novel adhesion-free thin-film-like curvature sensor that can monitor bending activities is introduced for flexible and wearable electronics. We present comprehensive design, fabrication, mechanism, structural analysis, performance characterization, and device-level demonstrations for bending of joints, gesture recognition, and real-time sitting posture correction. The most prominent advantage of the present sensor is that the measurement is independent of the strain of the target surface and the interfacial slippage, thus the perfect adhesion between the sensor and the surface is unnecessary. The features of adhesion-free, simple mechanical principle, low cost, and satisfactory monitoring results highlight the superiority of the present curvature sensors for practical applications to flexible and wearable electronics.

Keywords：Wearable electronics; curvature sensor; finite deformation; motion monitoring

*基金项目：国家自然科学基金项目（11572323）

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