

## Ultrasensitive mechanical crack-based sensor inspired by the spider sensory system

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Recently developed flexible mechanosensors are highly sensitive and can be applied to human skin. However, the development of a multifunctional sensor satisfying the requirements of ultrahigh mechanosensitivity, flexibility and durability remains a challenge. In nature, spiders sense extremely small variations in mechanical stress using crack-shaped slit organs near their leg joints. In this talk, we present that sensors based on nanoscale crack junctions and inspired by the geometry of a spider's slit organ can attain ultrahigh sensitivity and serve multiple purposes. The sensors are sensitive to strain (with a gauge factor of over 2,000 in the 0–2 per cent strain range) and vibration (with the ability to detect amplitudes of approximately 10 nanometres). The device is reversible, reproducible, durable and mechanically flexible, and can thus be easily mounted on human skin as an electronic multipixel array. We believe that understanding of unique sensory organs from insects and taking advantage of the specific, remarkable functions in the nature system can help not only developing biologically and ecologically adoptive sensors but will also developing relevant many cutting-edge electronics.