Utlrahigh Sensitive Mechanosensor based Geometrically Modulated Nanoscale Crack

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In previous research, ultrasesitive nanoscale crack based mechanosensor inspired by spider's sensory organ is presented.[1] The sensors are sensitive to pressure and vibration with the ability to detect amplitude of apporximately 10nm scale attributed to the phenomenon of disconnection-reconnection process by zip-like nanoscale crack interfaces under tiny extrernal stiumulations. To enhance the sensitivity, we considered the geometry of cracks. However, among many geometrical parameters of the cracks, crack depth is considered as a key factor to improve sensor's performance. In this presentation, we present ultrahighly improved performance of the nanoscale crack-based sensors by modulation of nanoscale crack geometry. By understanding of the main issue of crack sensors, we develop the sensor which shows superior sensing capability with a gauge factor over 15,000 in the 0-2% in strain range. We also demonstrate the sensors are applicable to wearable electronics like electronic skins.

[1] D. Kang et al., "Ultrasensitive mechanical crack based sensor inspired by the spider sensory system" Nature 516.7530 (2014): 222-226