Multilevel Microstructure Design of Flexible Pressure Sensor with High Sensitivity and Wide Pressure Range

Qifeng Du†, Jun Ai†, Ying Chen†, Xue Feng#,\*

**†** Institute of Flexible Electronic Technology of THU, Jiaxing, Zhejiang, China

**#** AML, Department of Engineering Mechanics, Tsinghua University, Beijing, China

\*Center for Flexible Electronics Technology, Tsinghua University, Beijing, China (fengxue@ifet-tsinghua.org)

Abstract

Flexible pressure sensors have attracted wide attention for applications in health monitoring and human-machine interface. However, the conflict between their high sensitivity and wide linearity pressure range restricts their practical applications. Herein, a simple and large-scale manufacturing method for the fabrication of a flexible capacitive pressure sensor with multilevel microstructured polydimethylsiloxane (PDMS) is presented. The multilevel microstructures consist of arrays of microscale bulge and multiholes produced by replicating the laser-ablated template and salt leaching method, respectively. Under different pressures, sharp increases in the contact area and additional dielectric constant changes caused by the multilevel microstructures contribute to the high sensitivity and the wide linearity pressure range. The flexible pressure sensor shows potential applications in the detection of human physiological signals, such as wrist pulse, heart rate, breathing rate and foot plantar pressure.