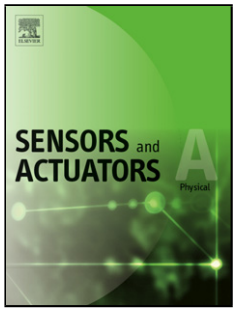

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Highly-sensitive linear tactile array for continuously monitoring blood pulse waves

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Highlights

- This work presents a tunneling piezoresistive tactile sensing device for continuous blood pulse waves monitoring.
- The device exhibits ultra-sensitivity assisted by the interlocked microdome structures of the conductive polymer layers.
- The design of an 8 × 1 linear sensing array greatly facilitates the acquisition of blood pulse wave signals from the radial artery.
- The proposed sensing array shows great repeatability and remains stable after 10,000 loading-unloading cycles.

ABSTRACT

This work presents the development of a tactile sensing array for continuous blood pulse wave monitoring. The polymer-based sensing device consists of two polydimethylsiloxane layers, which were patterned with microdomes transferred from nylon membrane filters. The microdomes form interlocked structures, which enable the tunneling piezoresistive effect and provide ultra-high sensitivity. The sensing array was designed in an 8 × 1 linear configuration, and the length-width ratio of each sensing element is about 8. This design facilitates the acquisition of blood pulse wave signals on the skin above a radial artery. The measured relationship between resistance and pressure force indicates that the sensor exhibits very high sensitivity (-6.08 kPa^{-1}). The array sensing results revealed that crosstalk between the sensing elements was nominal.