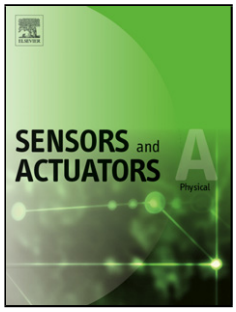

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Highly sensitive microfluidic strain sensors with low hysteresis using a binary mixture of ionic liquid and ethylene glycol

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Highlight

- Development of a new type of strain sensors by applying a microfluidic technique
- Reduction of signal hysteresis by introducing a binary mixture of ionic liquid and ethylene glycol
- Enhancement of sensing performance of the liquid-type strain sensors with high gauge factor

Abstract

We present a simple liquid-type strain sensor using a binary mixture of ethylene glycol (EG) and ionic liquid (IL) in a linear microfluidic channel. The EG/IL-based strain sensor showed highly sensitive response to tensile strain in a polydimethylsiloxane (PDMS) microfluidic channel. In addition, the EG/IL-based strain sensor exhibited outstanding signal recovery and high sensitivity to applied strain (200%) in an Eco-Flex microfluidic channel. The EG/IL-based strain sensor exhibited 2.3 times higher gauge factor at 200% strain, compared to the microfluidic strain sensor using neat IL. Moreover, the EG/IL strain sensor showed clear signal responses with negligible hysteresis, even at high strain speed of 16.667 mm/s. Compared to other liquid-type strain sensors, the EG/IL-based strain sensor exhibited very high resistance variations, surpassing the elastic channel deformation