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P7. MEMSNEMS and Actuators

Acid-treated PDMS surface to improve the non-wetting behavior of liquid metal

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Abstract

Galinstan the highly preferred liquid metal based microfluidic device provides a potential lead for flexible and stretchable electronics, but the oxide layer formed on their surface, resist their application. In this, we report a chemical modification technique, to inject Galinstan into the PDMS microfluidic channel. The PDMS microchannel is treated with sulfuric acid (H2SO4) make the liquid metal flow in a microfluidic channel easy without sticking to their surface and improve the non-wetting characteristics of oxidized Galinstan. We study the behavior of Galinstan on untreated, and sulfuric acid treated surface by SEM image and contact angle measurement. From the result, the sulfuric acid treated PDMS surface become rough does not allow Galinstan to stick, providing easy and efficient way to improve the non-wetting behavior of liquid metal. We also compare the velocity of Galinstan inside an untreated, and sulfuric acid treated PDMS microchannel to show the liquid metal applicability in microfluidic device fabrication. Electromechanical behavior of Galinstan with high stretchability and bulk electrical conductivity increases its use in microfluidic soft electronics, energy harvesting, stretchable antennas, and various human interactive biomedical applications.

Keywords: PDMS microchannel, Surface treatment, Liquid metal behavior, Non-wetting characteristics, Liquid metal electronics

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