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Investigation of contact line motions of EGaIn for microstructure fabrication

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ABSTRACT

Eutectic gallium-indium (EGaIn) are attracting growing attention in various engineering fields thanks to their combined properties of fluidity and high electrical conductivity. EGaIn has an oxide skin in the atmosphere with nanometer thickness, and the oxide skin results in unique interfacial behaviors. Although the oxide skin is a key factor for controlling the motions of EGaIn at a microscale, the interfacial physics of EGaIn has been little explored. Here, we present the results of investigation of the effective surface tension and contact angle of EGaIn with the oxide skin. Our experiments revealed that the effective surface tension depends on oxide wrinkle and showed that while the equilibrium and receding contact angles cannot be defined, a specific advancing contact angle is observed in EGaIn motion. We then develop a mathematical model for the advancing contact angle of EGaIn. Our study provides new insights into the manufacturing techniques of EGaIn for microscale electronic components.

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