Stretchable Conductors based on silver nanowires and liquid metals

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Abstract

The silver nanowire networks have excellent mechanical compliancy due to the large length-to-diameter aspect ratio of silver nanowires. However, the slippage of the wire lap in the process of stretching leads to the decrease in electrical conductivity. In this study, liquid metal was introduced into silver nanowire system in order to address the dilemma in the conductivity and stretchability trade-offs to some extent. As the dynamic connection point of silver nanowires in the conductive networks, the liquid metal provides a conductive path during stretching, which ensures the good and stable electrical conductivity of the system. The rheological property of the composite system was adjusted to make it suitable for direct writing printing process. The composite conductive material was printed on flexible substrates such as polyurethane (PU) and polydimethylsiloxane (PDMS) to prepare stretchable conductive arrays. The effect of the tensile rate and the number of stretches on the conductivity was tested. The stretchable conductor and its preparation process can be applied to the fields of stretchable sensor, flexible robot and flexible display.

References

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