

Abstract Submitted
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Highly stretchable and transparent electrodes of Au nanomeshes

CHUANFEI GUO, Univ of Houston — Metallic nano-networks or nanomeshes may serve as the flexible transparent electrodes (FTEs) for bendable and foldable electronics. Here we present Au nanomeshes made by grain boundary lithography, showing good electrical conductance and transparency comparable to ITO film, but exceptionally high stretchability. The sheet resistance increases only ~ 3 times when stretched to an ultra-large strain of 160%. The Au nanomeshes also exhibit excellent performance under cyclic strain, and work well after exposing to high temperature of up to 500 °C. In addition, the low surface roughness enables good compatibility with device integration. The ultra-large stretchability of the Au nanomesh FTEs lies in a subtle balance between two roles played by the underlying elastomeric substrate. The vast difference in the elastic moduli of Au and the substrate allows the stretched Au mesh to deflect and twist out of the plane, while the elastomeric substrate stabilizes distributed rupture of Au ligaments. The Au nanomesh may be used as a FTE for bendable and foldable electronics.

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