

Research of mechanical stresses in the substrate construction with metal conductors of different shapes

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When forming stretchable interconnections, due to the non-plastic nature of metals, a special curved shape of conductors is required. This reduces the emerging stresses in the metal, which can lead to defects in the topology. The effect of mechanical deformations in the structure of a stretchable PDMS-based substrate with copper and gold conductors of different shapes was investigated. Based on the simulation results, the zones with maximum stresses where defects are most likely to occur under uniaxial tension for each type of conductor were determined. The effect of stretchable substrate thickness under different applied loads on mechanical stresses was determined as a function of conductor shape. The effect of rounding at the locations of the maximum stresses in the conductors was considered. The best conductor shape among the considered ones, which allows to compensate the applied loads of one-dimensional deformation to a greater extent, is determined.

Keywords: stretchable electronics, stretchable substrates, organosilicon compound, mechanical deformations, PDMS, horseshoe shape, wearable bioelectronics.

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