

Development of stretchable electrode based on polymeric nanofiber and nanoparticle composites

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Conductive electrodes and electric circuits that can remain active and electrically stable under large mechanical deformations are highly desirable for applications such as flexible displays, field-effect transistors, energy-related devices, smart clothing, and actuators. However, high-conductivity and stretchability seems to be mutually exclusive parameters. Here we introduce a conductive composite mat of silver nanoparticles and rubber fibers that allows the formation of highly stretchable circuits through a fabrication process that is compatible to any substrate and scalable for large-areas applications. Silver nanoparticle precursor is absorbed in electrospun poly(styrene-block-butadiene-block-styrene) (SBS) rubber fibers and then converted into silver nanoparticles directly in the fibers mat. Percolation of the Ag nanoparticles inside the fibers leads to a high bulk conductivity which is preserved at large deformation.