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POLYISOPRENE-NANOSTRUCTURED CARBON BLACK FUNCTIONAL COMPOSITE FOR PRESSURE SENSORS

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ABSTRACT

Broad use of compressive and strain sensors requires new materials to be designed for particular application. Usually pressure and strain sensors are a form of rigid structures making it difficult to integrate the sensor into the structure being monitored. Recent research approved polyisoprene-nanostructured carbon black composite (PNCBC) to be a prospective material for developing super elastic mechano-electrical sensors. At certain concentrations of conductive filler PNCBC shows remarkable reversible tenso and piezorezistive effect. This is explained by sharp change of tunnelling currents between filler particles, caused by mechanical deformation. Proper use of this property of PNCBC could lead to mass production of cheap, variable size, completely flexible sensors with wide rage of application. In this work we are investigating the effect of filler concentration and vulcanization pressure on final sensor properties of PNCBC. To investigate the process of development of the percolative filler network we although present an original attempt to make an in-situ investigation of composites electrical properties during vulcanization. The dependence of piezoresistive effect on the curing time is although investigated. We believe that our research will lead to a new kind of functional sensor composite material, which could be used for intelligent sensing of ambient conditions for robotics and other smart structures.