

THE ELECTRICAL PERCOLATION SHIFT IN POLYISOPRENE – NANOSTRUCTURED CARBON COMPOSITE

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ABSTRACT

Previous research approved polyisoprene – nanostructured carbon composite (PNCC) as a prospective material for use as a piezoresistive pressure sensing material in finger pressure range. The major advantage of this material would be hyperelastic flexibility compared with conventional ceramic piezoelectric pressure sensing elements as well outstanding sensitivity for small pressures. The PNCC is made when highly structured particles of good conductor (Printex XE2 carbon black) and necessary curing ingredients are dispersed into elastomer matrix (Thick Pale Creppe natural polyisoprene) and vulcanized afterwards. There electrical percolation of PNCC greatly depends on mixing method used. In our work we try to use ultrasound as an alternative way to disperse filler. The roll mixed, mechanically mixed in solution and ultrasound mixed in solution PNCC samples were made for determination of percolation thresholds. The critical concentrations were determined and critical coefficients were calculated for all types of PNCCs using linear trendlines on log-log plots. The piezoresistive behaviour of PNCCs was evaluated and compared.