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ABSTRACTS

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Soft Piezoresistive Pressure Sensor Carpet Concept

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Previous studies of polyisoprene – nanostructured carbon black composites (PNCBC) have proven that, depending on the carbon black concentration and dispersing methods, this material has got slighly higher or lower piezoresistive properties [1]. Since this material is hyperelastic it can be used to detect dynamic forces. Piezoresistive effect can be observed at relatively small pressures as well as large pressures.

In this work we are trying to use PNCBC as a potential material for pressure sensor carpet application. Raw rubber composition with necessary vulcanization ingredients and variable electro conductive carbon black concentrations were made in Baltic Rubber factory. To determine electrical percolation behavior raw PNCBC was vulcanized with brass electrodes in a die, afterwards obtained results where treated with statistical percolation theory. Also piezoresistive effect was determined under 1 and 10 atmospheres of pressure.

Based on this knowledge we produced a fully elastic pressure sensor system that consist from elements with various concentration of conductive filler. To make this possible each element was prevulcanized separately and afterwards vulcanized in to a one solid block. Prevulcanization conditions where determined experimentally at constant temperature and pressure while gradually increasing curing time until rubber element is able to retain its shape under small deformations. Afterwards piezoresistive properties for fully elastic pressure sensor system where determined under 1 (Figure 1) and 10 atmospheres of pressure.

1. J.Zavickis, A.Linarts, M.Knite. The electrical percolation shift in polyisoprene – nanostructured carbon composite. In full text proceedings of Conference of Young Scientists on Energy Issues, May 27-28, 2010 Kaunas, Lithuania, p.408-415, ISSN 1822-7554.

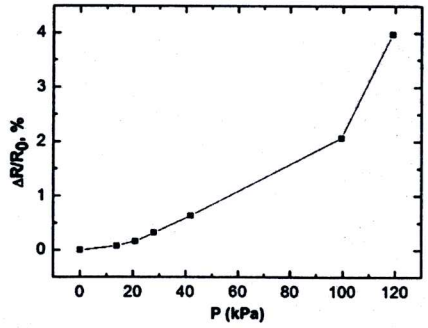

Fig.1 Piezoresistive response of fully elastic pressure sensor carpet under 1 atmosphere of pressure.