

Smart elastomer materials and products

Rubber and other elastomer materials can be made smart by either utilizing signals produced by the intrinsic physical properties of the materials or by embedding transducer elements into the material. The electronics needed to measure, process and transmit the signal produced by smart materials can be placed on the surface or buried inside the product.

The goal of KÄLY-project (Smart elastomer materials and products) is to develop new active materials and sensor structures so that sensing can be integrated into the rubber products. Smart materials can be used to measure external events or product's own state. Smart products such as bumpers, vibration dampers, tires, linings, gaskets and seals can be enhanced by measuring e.g. impact, vibration, shape distortion, tilt, wear and tear, or pressure.

The project concentrates on developing conductive and magnetic rubber materials, techniques to embed flexible electronics into vulcanized rubber and industrial applications. Several new materials are processed and characterized. The embedded electronics include passives, sensor components, microcontrollers, short range radio components and antennas on several different PCB-materials. Pilot studies are carried out with wear sensors and elastomer integrated sensors for remote diagnostics of elastomer products.

The research is carried out by the TUT Kankaanpää Unit and the TUT Institute of Plastics and Elastomer Technology between 1.7.2004 –30.9.2006. The project is funded by TEKES (Finnish Funding Agency for Technology and Innovation), Finnprofiles Oy, Hexamer Oy, MacGREGOR Group, Metso Minerals, Metso Paper Inc., Nokian Tyres plc, Perlos Oyj, Reka Kumi Oy, Suomi Rubber Factory and Teknikum Oy.

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SEM picture of iron filled (20 phr) EPDM
(size of the iron particle < 180 µm)

