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New smart conducting elastomer blends of bi-based superconductor ceramics nartopartïcles reinforced natural rubber/low-densíty polyethylene for double thermistors, antistatic protectors, and electromagnetic interference shielding effectiweness applications

(2009) *Polymer Engineering and Science*, 49 (3), pp. 592-601.

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Abstract
A new conducting blend from natural rubber (NR), lowdensity polyethylene (PE), and Bi-based superconductor (BSCCO) nanoparticles was successfully formulated. Blends were prepared by means of an open tworoll mill for five ratios (100/0, 90/10, 80/20, 70/30, and 60/40 NR/LDPE). The microstructures of the blends were examined in terms of scanning electron microscopy (SEM), bound rubber (BR), cross-linking density (CLD), and Mooney viscosity (ftf-i oo). The mechanical properties like hardness (H) shore A, tensile strength (TS), and elongation at break (EB) of the blends were studied. The applicability of the blends as double thermistors, i.e., positive and negative coefficient of resistivity (PTCR/NTCR), was examined. The applicability of the blend for antistatic charge dissipation was also tested. Finally, electromagnetic interference response of conducting NR/PE-filled BSCCO in the frequency range 1-12 GHz has been studied. Shielding effectiveness of the conducting blends In the microwave range 8-12 GHz shows an attenuation of 44-60 dB for PE <10 wt%. IPOLYM. ENG. SCI., 49:592-601, 2009. © 2009 Society of Plastics Engineers.

ISSN: 00323888