OP-A-66

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INDUCED PERCOLATION OF ELECTRICALLY CONDUCTIVE GRAPHITE NANOSHEETS BY THE NETWORK ELASTICITY OF CROSSLINKED SILICONE RUBBER/GRAPHITE NANOCOMPOSITES

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Attempts have been made to make interconnected networks of conductive graphite nanosheets through the insulating silicone rubber vulcanizate as a binder within the porous structure of polyurethane to be used as electromagnetic shielding material. Effects of functionalized long chain hydrocarbons as compatibilizers in dispersing graphite nanosheets and enhancing the formation of conductive networks as well as lowering the conductive percolation threshold have been studied. The role of crosslink density (CLD) and hence elasticity of the crosslinked SR/graphite nanocomposites as the two important matrix structural parameters upon the ordering and percolation of the graphite nanosheets have also been investigated. In vulcanized nanocomposites with higher elastic modulus the conductive nanosheets were found to be percolate, leading to the reduced threshold and also enhanced electrical conductivity. Therefore, dynamic elastic modulus and CLD of the nanocomposite vulcanizate has a direct correlation with electrical conductivity. This was found to have a thermodynamic nature as the SR network resist the entropy loss caused by the dispersed graphite nanosheets. Therefore, CLD showed as an effective tool in controlling both conductivity and percolation threshold. More over, the more dispersion of the graphite nanosheets by the compatibilizer leads to the reduced electrical conductivity threshold and also improved electromagnetic shielding effectiveness in the foamed structure of the polyurethane.