

عنوان مقاله:

Micromechanical modeling to analyze the reinforcing efficiency of carbon nanotube and high structure carbon black on the mechanical properties of styrene-butadienerubber

محل انتشار:

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خلاصه مقاله:

In this paper, multi-walled carbon nanotubes (MWCNTs) and a conductive carbon black (CCB) with average diameter of 30 nm were studied as reinforcing fillers in a styrene-butadiene rubber (SBR). The compounds were mechanically mixed and cured with an efficient sulphur/accelerator curing system. Compared to neat SBR vulcanizate, MWCNT showed a strong influence on the elastic modulus (up to 350% increase) and tensile strength (up to 200% increase), while the elongation at break was almost retained. Interestingly, the mechanical properties of CCB filled SBR (particularly tensile strength) was found to be much higher than the MWCNT filled SBR at the similar filler loadings. Reinforcing efficiency of the nanoparticles was investigated by the micro-mechanical models in terms of anisotropic parameter (f). Higher influence of CCB with respect to MWCNT was attributed to larger rubber shell region around the filler caused by its higher specific surface area compared to conventional carbon black. The results indicated that CCB with high specific surface area is much more effective than the MWCNT in enhancing mechanical properties for SBR nanocomposites processed by mechanical mixing.

کلمات کلیدی:

SBR; Nanocomposite; Carbon Nanotube; Mechanical Properties; Micromechanical models

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