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The Role of Halloysite's Surface Area and Aspect Ratio on Tensile Properties of Ethylene Propylene Diene Monomer Nanocomposites

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Abstract : The influence of three different types of halloysite nanotubes (HNTs) with different dimensions, namely as camel lake (CLA), Jarrahdale (JA) and Matauri Bay (MB), on their reinforcing ability of ethylene propylene dine monomer (EPDM) were investigated by varying the HNTs loading (from 0-15 phr). Mechanical properties of the nanocomposites improved with addition of all three HNTs, but CLA based nanocomposites exhibited a significant enhancement compared to the other HNTs. For instance, tensile properties of EPDM nanocomposites increased by 120%, 256% and 340% for MB, JA, and CLA, respectively with addition of 15 phr of HNTs. This could be due to the higher aspect ratio and higher surface area of CLA compared to others. Scanning electron microscopy (SEM) of nanocomposites at 15 phr of HNT loadings showed low amounts of pulled-out nanotubes which confirmed the presence of more embedded nanotubes inside the EPDM matrix, as well as aggregates within the fracture surface of EPDM/HNT nanocomposites.

Keywords : aspect ratio, halloysite nanotubes (HNTs), mechanical properties, rubber/clay nanocomposites
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