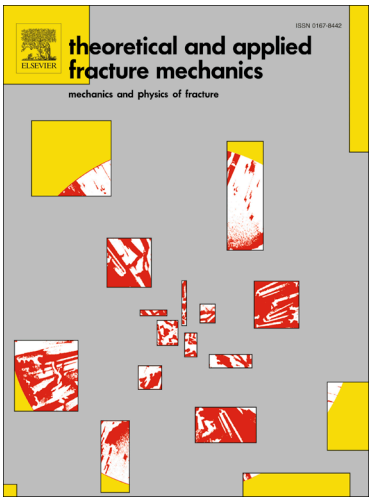

The effect of agglomeration on the fracture toughness of CNTs-reinforced nanocomposites

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The effect of agglomeration on the fracture toughness of CNTs-reinforced nanocomposites

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Abstract

Carbon nanotubes (CNTs) may improve or degrade the fracture toughness of epoxy polymers. The improvement strongly depends on the density of isolated CNTs dispersed in the nanocomposites. On the other hand, the degradation is mainly related to the density of CNTs agglomeration. Hence, the main objective of this paper is to investigate the effect of CNTs agglomeration on the fracture toughness of CNTs/epoxy nanocomposites. First, a theoretical model was developed to predict the fracture toughness of nanocomposites reinforced with well-dispersed CNTs. Then, by introducing a semi-empirical factor, the model was used to predict the effect of CNTs agglomeration on the degradation of the fracture toughness of the nanocomposites. To validate the model, in addition to pure epoxy specimens, 0.1, 0.3, 0.5, 0.6 and 0.7 wt.% MWCNTs-reinforced epoxy samples were fabricated. The Young's modulus and fracture toughness of the samples were experimentally measured. It was observed that the predictions are in a very good agreement with the experimental results.

Keywords: *Agglomeration; carbon nanotubes; epoxy; nanocomposites; theoretical model*