عنوان مقاله:

Theoretical Predictions on Mechanical Properties of Functionally Graded Epoxy/Clay Nanocomposites

محل انتشار:

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خلاصه مقاله:

In this paper, the theoretical predictions of mechanical properties of functionally graded and uniform distributions Epoxy/clay nanocomposites are presented. The specimens were prepared for uniformly distribution of nanoclay with different nano particles weight percent (pure, 3 wt%, 5 wt% and 7 wt%) and functionally graded distribution. The distribution of nanoparticles has been investigated by Field Emission Scanning Electron Microscopy (FESEM). For uniformly distribution of nanoclay, it is shown that there is no sign of the agglomerates found via FESEM imaging which can address well the distribution of nanoclay particles in epoxy. In addition, for functionally graded distributions, it is found that dispersion of nanoclays vary smoothly and continuously from one surface to the other one. The mechanical properties have been determined by simple extension tests. The results of extension tests show that elastic modulus begins to increase up to 5 wt% of nanoclay and then decreases. So, for functionally graded distribution, the elastic modulus is generally larger than the corresponding values for uniform distribution of nanoclay. The theoretical predictions of Young's modulus for functionally graded and uniform distributions nanocomposites are calculated using a genetic algorithm procedure. The formulation for Young modulus includes the effect of nanoparticles weight fractions and it is modified for functionally graded distribution. To investigate the accuracy of the present theoretical predictions, a comparison is carried out with the experimental results. It is found that the results obtained from the theoretical predictions of genetic algorithm procedure are in good agreement with the experimental .ones

کلمات کلیدی:

Epoxy, clay, Functionally graded, Genetic Algorithm Theory, nanoparticles