عنوان مقاله:

Preparation of Nitrogen-Doped Graphene Aerogel/Epoxy Nanocomposites and Experimental Study of Mechanical Properties

محل انتشار:

مجله بین المللی طراحی پیشرفته و تکنولوژی ساخت, دوره 13, شماره 4 (سال: 1399)

تعداد صفحات اصل مقاله: 7

نویسندگان:

ali kordi - *Department of Mechanical Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran*

saeed adibnazari - *Department of Aerospace Engineering, Sharif University of Technology, Tehran, Iran*

Ali Imam - *Department of Mechanical Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran*

mohammad najafi - *Department of Mechanical Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran*

maryam ghasabzadeh saryazdi - *Vehicle Technology Research Institute, Amirkabir University of Technology, Tehran, Iran*

خلاصه مقاله:

Nitrogen-Doped Graphene Aerogel (N-GA) nanomaterials can significantly improve the functional efficiency of polymer composites due to its three-dimensional structure and suitable physical properties. The preparation process affects the performance improvement. In this study, the effect of preparation method and the mechanisms affecting the strength behavior of Nitrogen-doped Graphene Aerogel/Epoxy (N-GA/E) nanocomposites was investigated. For this purpose, nanoparticles of Graphene Oxide (GO) were produced using Hummers' method; then, the N-GA was synthesized using the hydrothermal method and the freeze-drying process. The characterization experiments were used in order to confirm the structure and quality of the synthesized nanomaterials. Then, specimens of nanocomposite were prepared by adding weight percentages of 0.05, 0.1, 0.2, 0.5, 1, and 2 from the synthesized N-GA to the epoxy resin. In other preparation processes, N-GA/E nanocomposite specimens were produced using auxiliary solvents. After tensile tests, the best strength performance was observed in the specimens with the preparation process in which acetone solvent was used. The tensile strength and modulus of these nanocomposite specimens have increased by 23% and 20% compared to neat epoxy specimens, respectively. Also, the optimal weight percentage of N-GA nanomaterials for distribution in epoxy is 0.1 wt.%. Microscopic images of the fracture surfaces of the specimens used in the tensile test showed that the placement of N-GA porous plates in epoxy with the creation of the mechanism for micro crack formation led to more energy absorption during the stretching process of .the N-GA/E nanocomposites

کلمات کلیدی:

Nitrogen-Doped Graphene Aerogel, nanocomposite, Morphology of Fracture Surfaces, Tensile Properties