Using 1D and 2D Nanomaterials as a reinforcement

Nadiim Domun
Homayoun Hadavinia, Keith R. Paton

School of Mechanical & Aerospace Engineering
Kingston University London – UK
National Physical Laboratory, Hampton Road - UK

K1016352@kingston.ac.uk

Abstract

The addition of low-dimensional nanomaterials such as graphene nanoparticles (GNP), hexagonal boron nitride (h-BN) , carbon nanotubes (CNT) and boron nitride nanotubes (BNNT) to epoxy resin is a highly effective technique for reinforcing fibre reinforced polymer (FRP) composite structures. Understanding the mechanical and thermal behaviour of the effect of both nanomaterials on the epoxy resin is fundamental in an effort to develop novel nanocomposite. To obtain maximised performance of such nanocomposites however, dispersion techniques and chemical functionalization must be optimised.

In this paper, a range of nanomaterials are incorporated in epoxy resins and the mechanical performances of the resulting nanocomposites are investigated. The influence of both 1D and 2D nanofillers on the fracture toughness (G_{IC}), stiffness (E), ultimate tensile strength (UTS), glass transition temperature (T_g) and coefficient of thermal expansion (CTE) are analysed. The findings at various content loading, for both the nanomaterials are compared with the pristine epoxy resin. Scanning Electron Microscope (SEM) is used to evaluate the effect on the fracture surface of the nanocomposite.

References

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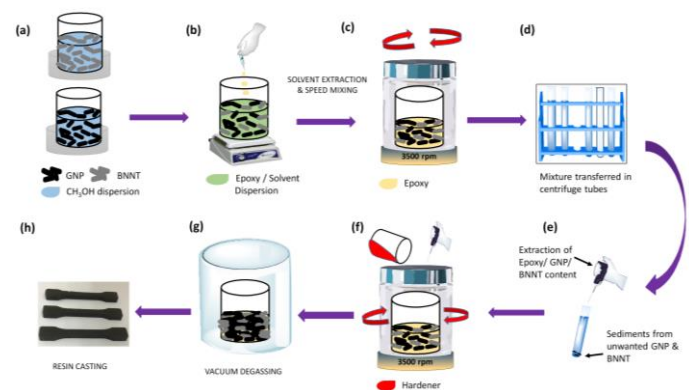
Figures

Figure 1: Schematic diagram of the processing of nanocomposites