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Studying the effects of functionalized multi-wall carbon nanotubes on mechanical and thermal properties of epoxy composites

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The goal of this study is to distinguish the effect of functionalized Multi-Wall Carbon Nanotubes (MWCNTs) on thermal and mechanical properties of epoxy composites. The custom-made epoxy resin system is composed of two different kinds of resin one with low viscosity (EPON 828) and the other one with high viscosity (EPON 1001F). The reason why functionalization of MWCNTs has been used is because of poor dispersion and agglomeration structures of CNTs. In order to overcome these obstacles, functionalization is prosperous method to strengthen interfacial adhesion between epoxy resin and MWCNTs. The CNTs were functionalized with carboxyl and diamine groups by different weight ratio of 0.1 wt%, 0.2 wt%, 0.5 wt% and 1 wt% of nanotubes during the process of functionalization. The performance of introduced approach is demonstrated through using thermal and mechanical analysis with different weight ratio. The result has been shown a decent increase on curing temperature and T_g. Based on our TGA results, both amin and carboxyl nano-functionalized samples have shown reduction in the amount of activation energy compared to neat epoxy sample. So it means that adding functionalized CNTs would decrease thermal stabilities and increase degradation efficiencies. In addition, nano-composites with low loading levels of CNTs have been shown the greatest improvement in Tensile strength and Young's modulus properties. The improvement in thermal and mechanical properties by addition of functionalized MWCNTs would extend the engineering application of epoxy resin composites.

Biography

Nasim Hadiashar has completed her Master's at Santa Clara University. She has been working on different collaboration research project with Thermo Fisher Scientific. Her projects mainly focused on mechanical and thermal properties of nano-composites with different applications.

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