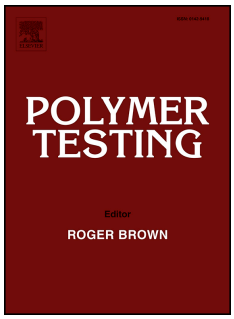

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Abstract

PVA nanocomposites are envisioned as a novel material for environmental applications due to its formidable thermal and mechanical properties. To enhance the mechanical strength, nanofiller incorporated Poly (vinyl alcohol) thin films have been fabricated by biomimetic approach. Graphene Oxide (GO) was prepared by modified Hummer's method which was further chemically reduced by using hydrazine hydrate. Dispersion of reduced graphene oxide into PVA matrix is facilitated by hydrogen bonding due to strong interfacial interactions. SEM morphology revealed uniform dispersion of (RGO) reduced graphene oxide nanoparticles via mild sonication Incorporation of graphene oxide results in ductile to brittle behaviour of nanocomposites. The results showed a significant improvement in mechanical strength i.e 67.21 MPa of tensile strength on addition of 0.3% RGO as compared to neat PVA which is 33 MPa. SEM analysis revealed that the nanofiller particles are uniformly distributed throughout the surface. Nanoindentation analysis has crucial role in thermal barrier coatings, paints and semiconductors synthesized from polymeric materials. Nanoscratch test revealed that neat PVA has 1.22 GPa reduced modulus but on addition of 1% RGO, it becomes 5.22 GPa. Degree of crystallinity and melting enthalpy of PVA – RGO nanocomposites were investigated by thermal analysis.

Keywords: Poly (vinyl alcohol); Reduced Graphene Oxide; Hardness; Nanoindentation; Nanoscratch.