

Solution Processed Graphene/EVOH Hybrid Films with Improved Thermal and Mechanical Properties

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Recently, graphene has drawn much attention due to its excellent thermal and mechanical properties as well as superior electrical and gas impermeable characteristics. In this study, we attempted the preparation of nanocomposite films using graphene nanosheets as the reinforcement and ethylene-vinyl alcohol copolymer (EVOH) matrix for the application of packaging films with enhanced thermal and mechanical properties. The exfoliated graphene oxide (GrO) nanosheets with different level of functionalization were obtained via liquid-phase chemical method. The preparation of transparent graphene/EVOH hybrid thin films with thickness of $\sim 40\mu\text{m}$ could be achieved using solution-based mixing and casting process, employing environmentally friendly solvent system consisting of ethanol and water. We investigated the effect of level of graphene loading and functionalization on the resulting morphology, optical transparency, thermal (crystallization behavior) and mechanical tensile properties (strength/modulus/elongation) of the prepared hybrid films.