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Flame retardant nanocomposites for engineering application

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Abstract

Addition of flame-retardant material to polymer will increase resistance of material to ignition, suppress propagation of flame and reduces spread of flames with minimal degradation of the polymer properties. A Novel graft copolymer of tris (2-methoxy ethoxy) vinylsilane (TMEVS) onto ethylene propylene diene terpolymer (EPDM) has been developed by grafting TMEVS using dicumyl peroxide as an initiator (EPDM-g-TMEVS) in a brabender plasticorder. Grafting of TMEVS onto EPDM was ascertained using FTIR. Suitable interfacial compatibilizer was synthesized by grafting of HDPE with glycidyl methacrylate (HDPE-g-GMA) with benzoyl peroxide as initiator. The EPDM-grafted-TMEVS developed was blended with different weight percentage of HDPE and nanoclay. Different blend systems were prepared with varying amount of nanoclay (0 – 10% w/w %) and compatibilizer. The blends were analyzed for its thermal, mechanical, electrical, flame and morphological properties. The effect of nanoclay and the synergy with the compatibilizer on different properties of blends is studied accordingly and discussed. The results of the characterization indicated that the mechanical properties of the blends improved significantly with the addition of nanoclay and compatibilizer. However no improvement in the hardness value was observed upon addition of nanoclay and compatibilizer. The composition dependence of the blends tensile strength in presence of nanoclay and compatibilizer was assessed using suitable mathematical models and it was observed that from the Turcsanyi model the compatibilized blends exhibited an improved interfacial adhesion and so the improved tensile strength. Further the improved interfacial adhesion was also assessed and confirmed by high resolution electroscope (SEM and TEM) images.

Biography

Dr R Suresh has 29 years of teaching and research experience. He is currently the Head (Chairman) of Chemical Engineering Department, R V College of Engineering, Bangalore, a top ranked Engineering college in India. He was involved in developing fuel cell and guided several UG projects related to sustainable energy technology, has guided several MSC and PhD students on renewable energy, Gasification Technology, gas separation, sandwich structures, Nano-Composites. He has completed six funded projects as Principal coordinator. Consent Committee Member, Karnataka State Pollution Control Board. Principal Coordinator Hydrogen Economy Technology Program. Group Director, Foundation for Clean Energy and Environment.