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PREDICTION OF MECHANICAL PROPERTIES OF PP/EVA POLYMER BLENDS GOVERNED BY EVA PHASE CHANGE IN THE PRESENCE OF ENVIRONMENTALLY FRIENDLY INORGANIC TUNGSTEN DISULFIDE NANOTUBES (INT-WS2)

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Anticipating dynamic mechanical behavior of polymeric materials over long period of time and under different frequencies is the first step to be taken to afford loadbearing applications. Nevertheless, what we know about dynamic mechanical behavior of polymers is only limited to experiments, which necessitates large pools of data spending too much money, time and energy. Environmentally-friendly inorganic tungsten disulfide nanotube (INT-WS2), was introduced to polypropylene/ethylene vinyl acetate copolymer (PP/EVA, 75/25 wt/wt) blends through melt mixing and dynamic mechanical analysis (DMA) frequency sweep tests were performed to obtain master curves based on time-temperature superposition (TTS) theorem. The influence of EVA phase change (solid, semi-solid and melt domains) on the creep and recovery behavior of nanocomposites in linear region was then studied. It was found that using INT-WS2 along with PP-g-MA results in distinctive improvement in creep-recovery response of nanocomposites. Burger and Weibull models were used to mimic viscoelastic behavior of the nanocomposites. Creep compliance master curves predicted creep compliance, while analysis of cyclic creep-recovery at 30 8C revealed almost constant permanent strain parameters for sample having 5wt% INT-WS2 and PP-g-MA after three times repeating test cycles. Influence of phase change phenomenon of EVA domains on creep-recovery behavior of nanocomposites was mechanistically demonstrated.

BIOGRAPHY

Reza Nikoomanesh has completed his Masters from Islamic Azad University, Iran in the field of Chemical-Polymer Engineering. He is the Head of Physical Mechanical Laboratory of Jam Petrochemical Complex, Iran.

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