Preparation and characterizations of thermoplastic elastomer based on maleated ethylene vinyl acetate (mEVA)/nylon11 blends

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Semicrystalline maleated polyolefin elastomer (mEVA) and nylon11 were melt blended in an internal mixer at 200oC with proportions of 90/10, 80/20, and 70/30 wt/wt, respectively. Fourier transform infrared spectrometer, melt viscosity measurement, differential scanning calorimetry, dynamic mechanical analysis and tensile testing were conducted to characterize the structure and properties of the blends. The results revealed that EVA-graft-nylon 11 copolymer was formed during the mixing, and the blends showed that two melting transitions were attributed to mEVA and nylon 11, respectively, which are depending on the blend composition. The blends exhibited the typical thermoplastic elastomeric behavior and their tensile modulus and strength increased with increasing the nylon content. It was also observed that the blends formed a physically-crosslinked structure until the melting transition of nylon 11 occurred. The blends exhibited an excellent thermally-triggered shape memory effect, i.e., almost 100% shape fixity rate and 100% shape recovery rate, and the recovery occurred in a few seconds when the temporarily fixed shaped sample was heated just above the Tm of mEVA phase in the blends.