Effects of Compatibility in Rubber / Polypropylene Blends

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Most polymer blends are incompatible and immiscible, i.e. they show a limited mutual solubility and often high interfacial tension. Their properties are crucially influenced by the morphology. One of the criteria for determining compatibility and phase structure of polymer blends is related to changes observed in glass transition of the mixed components.

The solubility behavior of various elastomer additives, i.e. processing promoters (PRMs) was studied in EPDM, NBR and polypropylene (PP) by using thermoanalytical and dynamic-mechanical methods. Binary rubber/thermoplastic blends containing selected PRM types were then investigated with regard to phase morphology, compatibilization and related final properties (stress-strain).

The incorporation of some additives resulted in significant effects on the physical characteristics of the mixtures. The glass transition of the components was clearly affected by the PRMs. This is due to the good solubility and partition of these additives arising from their favorable chemical nature and additional factors. The changes observed in T_g are highly dependent on characteristic features like chemical composition and polarity of the components. All thermal, viscoelastic and mechanical effects observed for the polymer/PRM mixtures and rubber/PP/PRM blends indicate that several additives act as efficient agents, considerably, contributing to the improvement of the dispersion, homogenization and compatibility of the investigated blends.

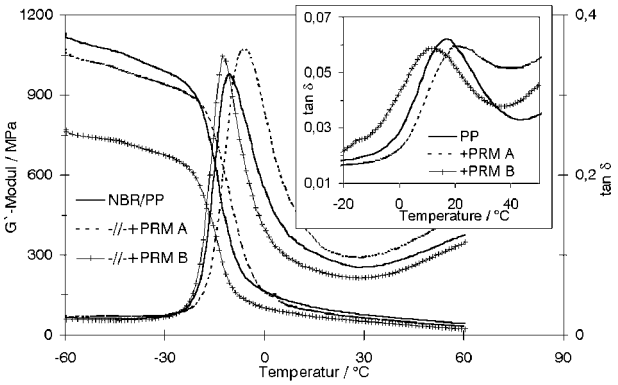

Abb. 1: Temperature dependence of the storage modulus G‘ and loss factor tan δ of NBR/PP blends as well as neat PP containing different processing promoters.