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PD en Física de Nanoestructuras y Materiales Avanzados/Physics of Nanostructures and Advanced Materials

THERMAL AND DYNAMICAL PROPERTIES OF FILLED AND UNFILLED CROSS-LINKED RUBBER BLENDS

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Rubber compounds are often composed of filled and cross-linked polymer blends. Some advantages in the use of blended materials include the possibility of tuning the properties of the compounds, obtaining in general materials with superior properties than the neat components and avoiding the synthesis of new materials, which is expensive and lengthy. In this work different compounds based on standard styrene-butadiene rubber (SBR) and its functionalized counterpart (fSBR), high cis polybutadiene rubber (cBR) and blends of these polymers have been studied. Unfilled and precipitated silica filled compounds were prepared using an internal mixer and then vulcanized under pressure. The samples so obtained have been measured by means of differential scanning calorimetry (DSC) and broadband dielectric spectroscopy (BDS) in a broad frequency (10-2 - 107Hz) and temperature (100 – 350K) range. From the calorimetric measurements, the temperature (Tg) and broadness of the glass transition as well as the heat capacity increment (ΔCp) were obtained and its dependence with the blend concentration and the polymer microstructure has been analyzed. From the dielectric measurements, the dynamics of the neat compounds and the blends has also been analyzed. In particular, the fragility has been correlated with the polymer microstructure.