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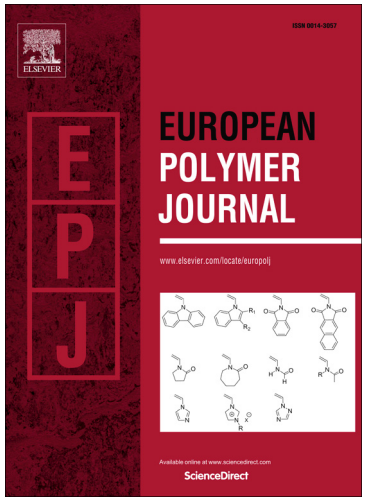

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Influence of Ground Tire Rubber Devulcanization Conditions on Properties of its Thermoplastic Vulcanizate Blends with Copolyester

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Abstract

Devulcanized rubber (DR) was prepared from used truck tires *via* thermo-chemical devulcanization. Effects of devulcanizing reaction time and temperature were studied, and the DR contained higher sol fraction but had lower crosslink density than un-devulcanized rubber (UDR). Furthermore, the soluble fraction (sol fraction) increased with devulcanizing time and temperature. Devulcanizing for 4 min at 180^{o}C was chosen as the most efficient alternative. Then, thermoplastic vulcanizates (TPVs) from blends of copolyester (COPE) with two alternative types of recycled rubber (i.e., DR and UDR) were prepared and their mechanical, morphological, rheological, thermal and swelling properties were investigated. It was found that the dynamically cured DR/COPE blends exhibited higher mechanical and thermal resistance than the dynamically cured UDR/COPE blends. Furthermore, the complex viscosity and storage modulus of the dynamically cured DR/COPE blends decreased with devulcanizing time, due to breakdown of the rubber network and the carbon main chains in rubber molecules. In addition, phase separated micron-sized vulcanized rubber domains were finely dispersed in the COPE matrix, and their size correlated well with the mechanical