

CROSS-LINKING HETEROGENEITIES WITHIN MICRO-/NANO-STRUCTURED ELASTOMER BLENDS: INFLUENCE OF THE CHAIN MICROSTRUCTURE

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Résumé :

Natural rubber (NR)/1,4-cis poly(butadiene) (BR) are elastomer blends widely used in the design of tire treads and anti-vibration materials, for which the BR component allows to enhance the NR thermo-oxidative ageing resistance¹. For most of these applications, the blends are usually immiscible. However, the BR chain microstructure, that is to say the content of 1,4-cis, 1,4-trans, and 1,2- (vinyl) units, has a deep influence on the NR/BR blend morphology: BR chains with a high 1,4-cis unit content will lead to immiscible NR/BR blends, whereas a BR with more than 90 mol% 1,2- (vinyl) units will result in miscible NR/BR blends. From this point of view, the BR microstructure could influence the cross-linking process in the blends and, in some way, their mechanical behavior.

NR/BR blends with an intermediate microstructure of BR (76 mol% of 1,2- (vinyl) units), poorly investigated in the literature, was considered in this work. For such blends, a single glass transition was detected by DSC which could suggest that these blends stand in the single-phase state. However, NR was characterized by a similar extent of cross-linking in these NR/BR blends² and in a pure cross-linked NR, indicating a possible phase-separation. Additionally, ¹³C solid-state NMR experiments revealed the occurrence of two coexisting **nanosized** domains. These experiments evidence that these domains are composed of NR, or BR chains, only (Figure 1).

The nanostructuration of these elastomer blends could represent a promising approach to yield new reinforcement mechanisms.

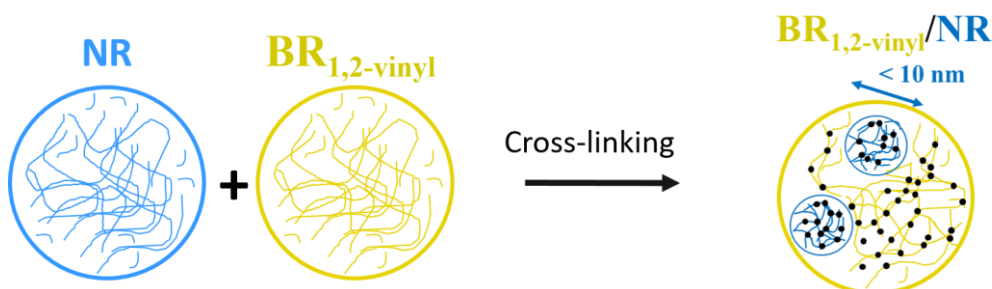


Figure 1: Nano-phase separation within NR/BR blend containing BR with a high 1,2- (vinyl) unit content

Références :

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