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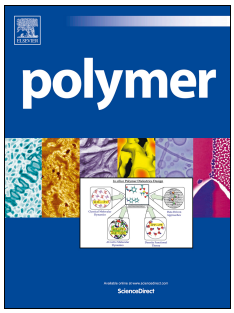

Filler-induced heterogeneous distribution of stretch-induced crystallization in natural rubber: An in-situ synchrotron-radiation micro-focused scanning X-ray diffraction study

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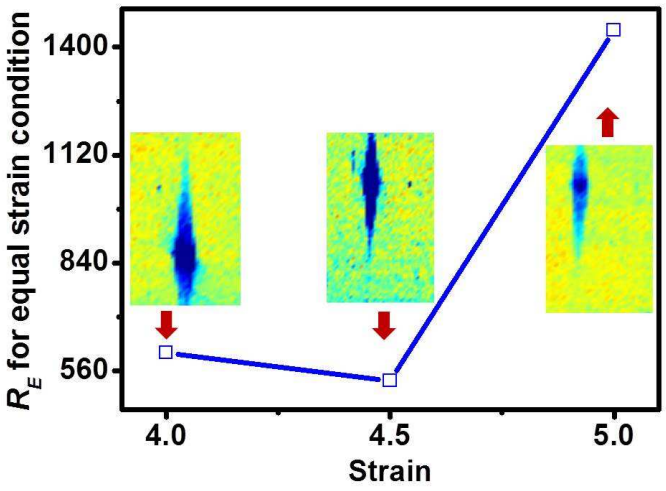

Due to the gradient stress field around the glass bead, the oscillatory distribution of crystallinities around the glass bead tends to form soft-hard double network with multi-scale hierarchical structures for toughness increase, which spontaneously responds to external strains. The mesh sizes along the long axis of the network structure along its long axis decrease slightly, suggesting denser network structures forming as strains increasing from 4.0 to 5.0. According to the equal strain condition, the quantitative calculation on fracture energy enhancement factors (R_E) are from 607 to 1444 times magnitude as comparing to that of structure with homogeneous distribution of crystallinity.

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