

Abstract Submitted
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Anomalous crack propagation in reinforced natural rubber PAUL SOTTA, CNRS/Rhodia Research and Technology, France, BRICE GABRIELLE, DIDIER LONG, LOIC VANEL, CNRS/Rhodia Research and Technology, PIERRE-ANTOINE ALBOUY, CNRS/University Paris XI, FRANCESCA PEDITTO, Rhodia Operations — In reinforced natural rubber, crack propagation in mode I exhibits rotation of the tear in a direction perpendicular to the usual one. Our objective is, first, to understand the impact of this phenomenon on fracture toughness of the material, and, secondly, to understand how this phenomenon is related to the specific properties of reinforced natural rubber. To this aim, we combine measurements of ultimate properties, measurements of the number and length of tear rotations as a function of loading velocity and temperature, and investigation of material heterogeneities at sub-micrometric scales, originating both from fillers and strain-induced crystallites (strain-induced crystallinity is measured up to failure by X ray diffraction), in natural rubber samples reinforced by nanometric aggregates. Observations suggest that tear rotation is related both to the mechanical anisotropy induced by strain-induced crystallinity and to the dissipative properties of the material at high strain.

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