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Nota di contenuto	Rupture dynamics of macromolecules -- In-situ structural characterization of rubber during deformation and fracture -- Morphology and Micro-Mechanics of Filled Elastomer Blends: Impact on Dynamic Crack Propagation -- Linking Mesoscopic and Macroscopic Aspects of Crack Propagation in Elastomers -- Macroscopical Modeling and Numerical Simulation for the Characterization of Crack and Durability Properties of Particle-Reinforced Elastomers -- Technical Material Diagnostics – Fracture Mechanics of Filled Elastomer Blends -- Analysis of Dynamic Crack Propagation in Elastomers by Simultaneous Tensile- and Pure-Shear-Mode Testing.
Sommario/riassunto	Elastomers are found in many applications ranging from technology to daily life applications for example in tires, drive systems, sealings and print rollers. Dynamical operation conditions put extremely high demands on the performance and stability of these materials and their

elastic and flow properties can be easily adjusted by simple manipulations on their elastic and viscous properties. However, the required service life suffers often from material damage as a result of wear processes such as abrasion and wear fatigue, mostly caused by crack formation and propagation. This book covers interdisciplinary research between physics, physical chemistry, material sciences and engineering of elastomers within the range from nanometres to millimetres and connects these aspects with the constitutive material properties. The different chapters describe reliable lifetime and durability predictions based on new fracture mechanical testing concepts and advanced material-theoretical methods which are finally implemented in the finite element method for structural simulations. The use of this approach allows a realistic description of complex geometrical and loading conditions which includes the peculiarities of the mechanical behaviour of elastomeric materials in detail. Furthermore, this approach demonstrates how multi-scale research concepts provide an ambitious interdisciplinary challenge at the interface between engineering and natural sciences. This book covers the interests of academic researchers, graduate students and professionals working in polymer science, rubber and tire technology and in materials science at the interface of academic and industrial research.