

ABSTRACT

Deformation-Induced Cavitation in Polymer-Based Materials: Two Decades of Investigation and Current Challenges

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After spending 20y to investigate deformation-induced cavitation in various polymeric-based materials, it is time summarize the main findings and look forward. The knowledge on cavitation phenomena is of fundamental importance when estimating the mechanical durability or understanding the failure of those materials used in an infinite number of applications. This review highlights the multiscale methodologies (optical extensometer, x-ray tomography, optical and electron microscopy, small-angle x-ray scattering) developed in the author's activities to characterize and quantify cavitation in semi-crystalline and rubber-based polymers during tensile deformation. Complementary methods and data from the literature will be also presented to provide an exhaustive description of cavitation phenomena. Another objective of this paper is the identification of research to be tackled in the field of cavitation. This relies on the development of novel cutting-edge characterization techniques that could be used to identify new aspects of cavitation. Furthermore, the development of novel sustainable polymer implies to in-depth study their mechanical durability, which is most of the time unexplored.