ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ

**ΣΧΟΛΗ ΘΕΤΙΚΩΝ ΕΠΙΣΤΗΜΩΝ**

**ΤΜΗΜΑ ΦΥΣΙΚΗΣ**

**ΟΜΙΛΙΑ**

**ΤΜΗΜΑ ΦΥΣΙΚΗΣ**

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**Πανεπιστήμιο Κρήτης**

**(Τμήμα Επιστήμης και Τεχνολογίας Υλικών)**

**& Ίδρυμα Τεχνολογίας και Έρευνας**

 **(Ι.Τ.Ε.- Ι.Η.Δ.Λ.)**

***«Some consequences of branches and free ends on polymer dynamics»***

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**Βιβλιοθήκη - κτίριο Φ2 - 3ος Όροφος**

**Some consequences of branches and free ends on polymer dynamics**

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It is now established that progress towards molecular understanding of the rheology of polymers with complex molecular structure can only be achieved through a synergy of state-of-the-art synthesis and characterization, physical experiment and modeling or simulations results. In this spirit, we present recent work addressing two different, albeit inter-related problems. (i) We investigate the shear stress transients and shear thinning behavior of model entangled branched polymers (combs). We discuss the observed features and attempt at rationalizing them by invoking the tube model and recent simulations. An important take-home message is that free ends are crucially important as they mediate the dynamic dilution of hierarchically relaxing segments, which controls linear and nonlinear viscoelasticity. (ii) We examine the viscoelastic response of ring polymers which have free ends at all. This is in fact a topic that has attracted the attention of scientific community in the 1980s. Here we show that proper purification of the rings via liquid chromatography at the critical condition is necessary in order to ensure absence of unlinked linear chains. We show that, for different chemistries, stress does not exhibit a plateau and relaxes instead in a self-similar fashion, conforming to the predictions of the lattice animal model and molecular dynamics simulations. In addition, the molecular weight dependence of ring viscosity and the extreme sensitivity of ring viscoelasticity to traces of linear chains are addressed. We close with a brief discussion of open challenges and perspectives in the field.

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