

Dynamics and Structure of Unentangled Associative Polymers

Research Achievement: vitrimers with short chain lengths but high bond-exchange energy barrier and cross-linker concentration follow reptation-like dynamics.

Significance and Impact: The dynamics of highly entangled (long chain) polymeric systems are described by the reptation model. Here, the reptation-like motion is observed in unentangled vitrimer.

Research Details:

- The subdiffusive exponents of the monomer and center of mass dynamics that are characteristic of entangled chains are observed.
- A transition diagram from a state of viscous liquid to a reversible elastomer is obtained by analyzing both the elastic and loss moduli.
- We build the connection between the relaxation of dynamic bonds and the resulting chains dynamics and linear viscoelastic behaviors.

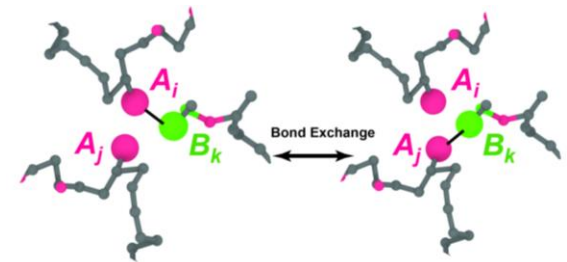


Figure 1: Sketch of bond-exchange reactions in vitrimers

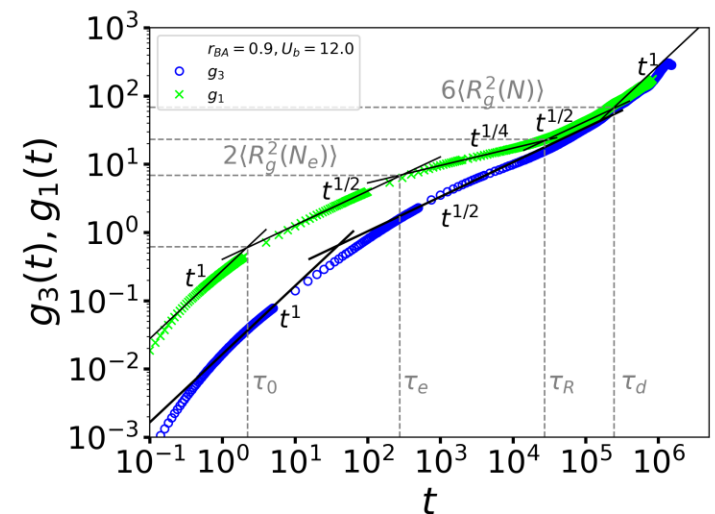


Figure 2: Mean-square displacements of inner monomers and center of mass of the main chain.

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