Effect of Molecular Defects on Dynamics and Viscoelasticity of Vitrimers

Research Achievement: the molecular defects, especially the relatively longer dangling end in block and gradient distributions, impair the effect of dynamic bonds on the dynamics and viscoelasticity of vitrimers.

Significance and Impact: The work suggests that the dangling defects can be leveraged for further development of recyclable and healable materials with fast stress relaxation and good flowability.

Research Details:

- Regardless of the energy barrier of bond-exchange reactions, the distribution type of stickers has a small influence on the relaxation of dynamic bonds.
- As the energy barrier increase, vitrimers with block and gradient distributions exhibit considerably faster relaxations of chain ends, Rouse mode, and stress and lower zero-shear viscosity in comparison to the analogs with random and uniform distributions.

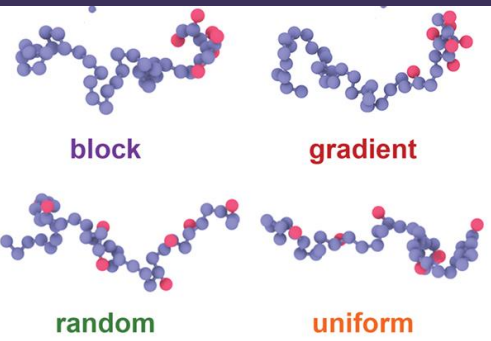

Figure 1: distribution types of stickers, namely, block, gradient, random, and uniform,

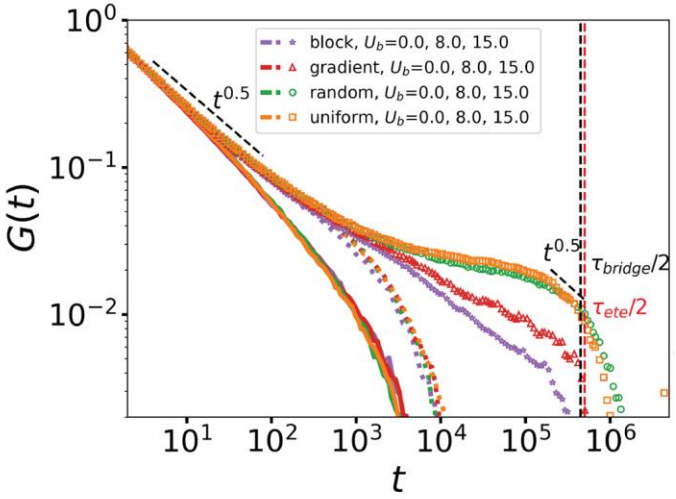

Figure 2: Stress relaxation modulus G(t) as a function of distribution types of stickers and energy barriers

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Support: NSF Center for the Chemistry of Molecularly Optimized Networks (MONET), CHE-2116298