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Heterogeneity: A Solution to the Mysteries of the Glass transition?[1] XIAOJUN DI, GREGORY MCKENNA, Department of Chemical Engineering, Texas Tech Univ — For most phase transitions, dynamic slowdown is accompanied by static structure change. However, in supercooled liquids there is a pronounced dynamic slowdown, i.e. diffusion coefficient, relaxation time and viscosity change 14 orders of magnitude within a small temperature range, without any static structure change. Over the past several decades, extensive research has been performed to understand this dramatic dynamical slowing, i.e., why the glass transition occurs? What exactly is the glass transition? And how molecules move near the glass transition? In the present work, the idea that the large decrease in mobility in supercooled liquids during cooling from above T_g occurs due to the increasing length scale of heterogeneous sub-regions, or the Cooperative Rearranging Regions (CRR) proposed by Adam and Gibbs, is evaluated by analyzing both experiment and computer simulation results. Although the existence of microscopic heterogeneous regions is confirmed, the values of the fitting parameters obtained from both VFT and power law fits of the temperature dependent heterogeneity data suggest that the heterogeneity, itself, might not play in the key role in the T_g and/or tightly connect with the CRRs.

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Xiaojun Di
Department of Chemical Engineering, Texas Tech Univ

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