

Abstract Submitted
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The slow relaxation mode - from solutions to gel networks CHI WU, The Chinese University of Hong Kong — In dynamic laser light scattering (LLS), we measure how long a scattering object takes to “move” (relax) a distance of $1/q$ (the LLS observation length), where q is the scattering vector and $\sim 35 \text{ nm} < 1/q < \sim 190 \text{ nm}$. Recently, by using the Staudinger ligation to attach special functional groups to a copolymer, PAMS-*co*-PS, we prepared a novel polymer that can undergo a neutral-charged-neutral transition in DMF with 0.5% H₂O when the solution is alternatively bubbled with CO₂ and N₂. Armed with this polymer, we re-examined dynamics of salt-free polyelectrolyte dilute solutions by using laser light scattering (LLS). As expected, there exists only one diffusive relaxation mode in the neutral state. The bubbling of CO₂ decreases the scattering intensity and splits this initial diffusive relaxation mode into a fast and a slow diffusive mode. One common perception is that a slowly moving subject is larger. However, we found that the intensity contribution of the slow mode is independent of the scattering angle, indicating that it is not related to some scattering objects larger than $1/q$. Combining our current and previous results of semi-dilute solutions and gel networks, we can generalize the slow mode as hindered motions of interacting polymer chains even though the nature of interaction can be very different, including electrostatic, segment-segment interaction in a less good solvent, and even chemical cross-linking. We wish to acknowledge the HKSAR RGC Earmarked Grant.

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