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Single Quantum Dot Tracking in Heterogeneous Polyacrylamide Hydrogels CHEOL HEE LEE, ALFRED CROSBY, RYAN HAYWARD, TODD EMRICK, University of Massachusetts Amherst — Structural heterogeneity within polymer gels plays an important role in determining their material properties, yet is difficult to characterize by established methods. Single particle tracking measurements can provide highly localized information on the diffusion dynamics of tracer particles, and therefore on the material properties of the medium. We use tailored core-shell quantum dots (QDs) with hydrophilic ligands to characterize polyacrylamide hydrogels with varying crosslink density. We find that QDs show sub-diffusive behavior and non-Gaussian displacement distributions, consistent with prior reports on diffusive behavior in other heterogeneous media. We also consider the distribution of particle caging times, which is dictated by the potential energy barriers to escape pores, and therefore provides insight into structural heterogeneity. Specifically, we find that gels with a higher density of crosslinks yield broader distributions of caging times, indicating greater heterogeneity of these networks.

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