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Structural changes in polymer gels probed by Fluorescence Correlation Spectroscopy ARIEL MICHELMAN-RIBEIRO, NIH / Boston University, HACENE BOUKARI, NIH, RALPH NOSSAL, NIH, FERENC HORKAY, NIH — We apply fluorescence correlation spectroscopy (FCS), a non-invasive optical technique, to measure the diffusion of small fluorescent probes (TAMRA, Mw = 430 Da; TAMRA-labeled dextran, Mw = 10 kDa) in semidilute, non-fluorescent – hence invisible– poly(vinyl alcohol) (PVA, Mw = 85 kDa) solutions and cross-linked PVA gels. The measurements indicate that for the same polymer concentration, the diffusion of the particles slows down when the polymer solution is cross-linked. Further, the more the polymer chains are cross-linked, the slower the particles diffuse. We attribute this effect to the formation of large-scale structural changes caused by cross-linking of the PVA chains. These results suggest that the cross-link density, which is often ignored in the analysis of probe diffusion data in gels, must be taken into account. Measurements of the elastic modulus support this conclusion, as indicated by the linear correlation between the diffusion time of the particles and the elastic modulus of the gels.

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