

Abstract Submitted
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Rotational and Translational Diffusion of Low Molecular Weight Nanoprobes in Ficoll Solutions.¹ ELTON JHAMBHA, ZAKARIA M'RAH, HACENE BOUKARI, Delaware State Univ — We combine fluorescence spectroscopy, fluorescence correlation spectroscopy, and fluorescence anisotropy techniques to probe changes of the fluorescence property, the translational diffusion, and the rotational diffusion of Alexa488 fluorophores (MW \approx 885 Da) mixed in non-fluorescent hence “invisible” aqueous Ficoll (MW \approx 70 kDa) solutions under thermal fluctuations. The fluorescence correlation functions can be readily fit with the expression describing normal particle diffusion. Changes of the diffusion coefficients cannot be accounted for by the corresponding changes of the bulk viscosity of the Ficoll solutions as would be suggested by the Stokes-Einstein relations for both diffusion coefficients. We analyzed the data with the entropic model proposed by de-Gennes and his collaborators, and fit each set of diffusion data with a stretched exponential [$\exp(-\alpha c^n)$] with n being related to the quality of the solvent. The fits yield n-value close to one, suggesting a theta-like behavior of the host Ficoll-water system. However, the α -value for translation is larger than that of rotation, indicating dissimilar local entropic effects on the rotation and translation.

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