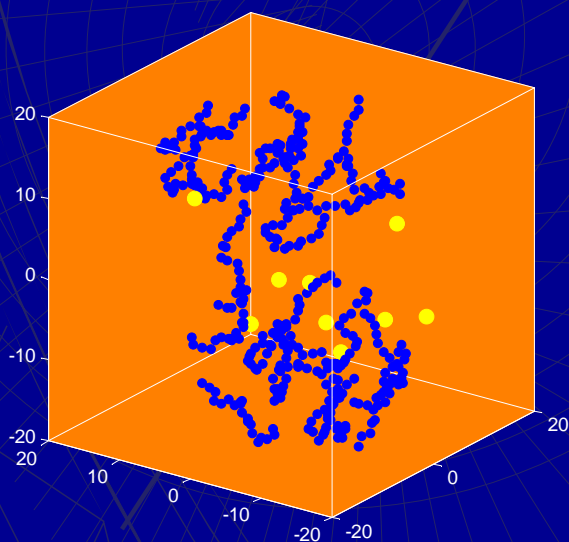


# Is It a Liquid or a Solid?

Complex fluids are widely used in paints, cosmetics, daily care products, pharmaceuticals industries, etc. A few examples are polymer solutions, surfactant solutions, and colloidal suspensions. These materials may behave like a liquid or a solid, depending on the processing conditions. Their fascinating phase, dynamics and flow behaviors are attributed to the rather different length and time scales of constituting chemical species. Our research group is investigating the behavior of complex fluids, including (1) clustering, bridging and dynamics of polyelectrolyte solutions, (2) gelation and clouding phenomenon of associative polymer solutions with surfactant, and (3) dynamics and phase behavior of surfactant solutions. A variety of experimental techniques are applied, including microrheology, laser light scattering, and traditional rheometry. Monte Carlo and Brownian dynamics simulations are also employed as microscopic, computational tools to verify and examine the static and dynamic behavior of complex fluids of various kinds. The aim of our group is to find out and understand the interplay between the microstructures of complex fluids and their bulk properties, which is essential to control and improve the product quality in practical applications.



A snapshot of diffusion of tracer particles (yellow) in a solution of polyelectrolytes (blue) by Brownian dynamics simulations in the application of microrheology. The tracer diffusivity can be determined from the mean square displacement of the tracer. The rheological properties can then be extracted.

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