Hofmeister effect on surface dynamics of single chains of a polyelectrolyte

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Although discovered over 100 years, Hofmeister effect is still under intensive investigations because of its unclear origin. The significance of researches on Hofmeister effect lies in the understanding the basics of aqueous systems, especially biological systems.

In this study, Hofmeister effect has been found to affect the lateral diffusion of single polyelectrolyte chains, which adsorb on a hydrophobic solid surface from aqueous solution. Using single molecule fluorescence techniques – fluorescence correlation spectroscopy and single molecule imaging, the lateral diffusion of single chains of sodium polystyrene sulfonate (NaPSS) has been studied.

The surface diffusion coefficient varies differently with salt concentrations, depending on the type of the salt in the aqueous media – the diffusion slows down at higher salt concentrations for most of the salt while it speeds up at higher levels of NaSCN and NaClO₄. The surface friction force experienced by the chain shows an opposite trend. The surface friction reflects a strengthening of hydrophobic interaction by most ions as well as the weakening of hydrophobic interaction by SCN⁻ and ClO₄⁻ ions. A detailed analysis on the relationship between the friction force and the parameters of the ions has been conducted.