Contribution ID: **31** Type: **Oral**

Translational diffusion of a fluorescent tracer molecule in nanoconfined water

Tuesday, 11 October 2022 11:40 (20 minutes)

Diffusion of tracer dye molecules in water confined to nanoscale is an important subject with a direct bearing on many technological applications. It is not yet clear however, if the dynamics of water in hydrophilic as well as hydrophobic nanochannels remains bulk-like. Here, we present diffusion measurement of a fluorescent dye molecule in water confined to nanoscale between two hydrophilic surfaces whose separation can be controlled with a precision of less than a nm. We observe that the fluorescence intensities correlate over a fast($\sim$ 30 μs) and slow ($\sim$ 1000 μs) time components. The slow timescale is due to adsorption of fluorophores to the confining walls and it disappears in presence of 1 M salt. The fast component is attributed to diffusion of dye molecules in the gap and is found to be bulk-like for sub-10 nm separations and indicates that viscosity of water under confinement remains unaltered up to confinement gap as small as $\sim$ 5 nm. Our findings contradict some of the recent measurements of diffusion under nanoconfinement, however they are consistent with many estimates of self-diffusion using molecular dynamics simulations and measurements using neutron scattering experiments.

Primary authors: Dr PATIL, Shivprasad (Indian Institute of Science Education and Research, Pune); Dr AJITH, VJ (Indian Institute of Science Education and Research, Pune)

Presenter: Dr PATIL, Shivprasad (Indian Institute of Science Education and Research, Pune)

Session Classification: Talks

Track Classification: Contributions