

IR Pump-Probe Spectroscopy of Nanoconfined Water Structure in Reverse Micelle

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Vibrational spectroscopy of solute molecules confined in the reverse micelle (RM) systems is an effective way to monitor the variation of their solvation environment and understand the nature of confined aqueous solution. Here we introduce two IR probe molecules that are N-methyl acetamide- d_7 (NMA- d_7) and hydrazoic acid (HN_3). Vibrational spectra of the amide I' and azido stretching mode show a clear separation between the core and shell spectral components. The measured vibrational lifetimes appear to be substantially different for the interfacial and bulk-like environments but show no remarkable size dependency, which indicates that water structures around this IR probe are distinctively different in the core and shell regions. The influence of local hydrogen bond network in the first and higher solvation shells on the vibrational dynamics of each IR probe molecule is further discussed.

1. J. Lee, J. Jeon, M. Kim, H. Lee and M. Cho Pure Appl. Chem. 86(2), 135-149 (2014)
2. J. Lee, M. Maj, K. Kwak and M. Cho J. Phys. Chem. Lett. 5, 3404-3407 (2014)