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## Effect of sugars on the dynamics of hydrophilic fluorophores confined inside the water pool of anionic reverse micelle: A spectroscopic approach

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### Abstract

In this article, we have investigated the structural and chemical effects of two sugar molecules, namely sucrose and sucralose on the structure of anionic reverse micelle (RM) AOT (aerosol-OT; sodium bis(2-ethylhexyl)sulfosuccinate)/*n*-heptane. The artificial sugar alternative sucralose shows very unique physical properties unlike other sugar molecules including sucrose and it is the reason behind choosing these two sugars in our study. The variation of shapes and sizes of the water pool of RM in presence of the two sugar molecules are investigated using dynamic light scattering (DLS) and small-angle X-ray scattering (SAXS) measurements. It is observed that addition of both the sugar molecules swell the water pool of the RM and this enhancement is greater for sucralose. Moreover, we have employed time-correlated single photon counting (TCSPC) and fluorescence correlation spectroscopy (FCS) techniques for hydrophilic probes Coumarin 343(C343) and Rhodamine 6G (R6G) respectively inside the RM and we have observed that these two sugar molecules strongly retard the solvation and rotational dynamics of C343 and the translational diffusion of R6G inside the RM. Replacement of the smaller sized water molecules by the larger sized sugar molecules at the interface of RM through stronger hydrogen bonding with the interfacial sulfonate moiety of AOT increases the microviscosity and this may be the probable reason behind the slow dynamics of the probes in presence of sucrose. Along with this factor, strong electrostatic interaction of highly polar molecule sucralose with RM interface and with the dye molecules further retards the dynamics of fluorophores. Therefore, sucralose molecule exhibits its distinct feature by swelling the water pool inside the RM and slowing down the dynamics of the hydrophilic probes to a greater extent compared to sucrose which provides a new aspect of RM and sugar interaction.

**Key words:** Reverse micelle; Sucrose; Sucralose; Rotational motion; Translational diffusion

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