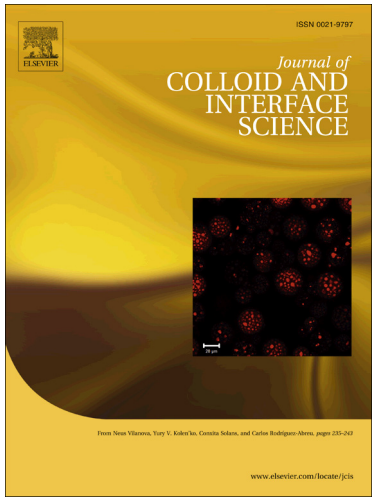

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Influence of Bile Salt on Vitamin E Derived Vesicles Involving a Surface Active Ionic Liquid and Conventional Cationic Micelle

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Abstract

This study has been actually performed with the aim to develop vitamin E derived vesicles individually from a surface active ionic liquid (1-hexadecyl-3-methylimidazolium chloride ([C_{16}mim]Cl)) and a common cationic amphiphile (benzyldimethylhexadecylammonium chloride (BHDC)) and also to investigate their consequent breakdown in presence of bile salt molecule. From this study, it is revealed that the rotational motion of coumarin 153 (C153) molecule is hindered as the vitamin E content is increased in the individual micellar solution of [C_{16}mim]Cl and BHDC. The extent of enhancement in rotational relaxation time is more pronounced in case of [C_{16}mim]Cl-vitamin E solutions than in the BHDC-vitamin E vesicular aggregates which confirms the greater rigidity of the former vesicular system than the later one. Moreover, the effect of bile salt in the vitamin E forming vesicular assemblies have also been unravelled. It is found that the large area occupancy by the steroidal backbone of the bile salt plays a crucial role towards the enlargement of the average surfactant head group area. This results in disintegration of the vesicles composed of vitamin E and consequently, vesicles are transformed into mixed micellar aggregates. From the anisotropy measurement it is found that the rotational motion of C153 is more hindered in the [C_{16}mim]Cl/BHDC-NaCh mixed micelles compared to that inside the individual vesicles. The fluorescence correlation spectroscopic (FCS) study also confirms that the mixed micelles have a more compact structure than that of the [C_{16}mim]Cl-vitamin E and BHDC-vitamin E vesicles. Altogether, the micelle to vesicle transition involving any vitamin and their disruption by bile salt would be an interesting investigation both from the view point of basic colloidal chemistry and towards the generation of new drug delivery vehicle due to their unique microenvironment. Therefore, in future, these systems can be utilised as vehicle for the transport and as well as delivery of drugs and as probable reactor in nanomaterial synthesis.