

Host-Assisted Delivery of a Model Drug to Genomic DNA: Key Information From Ultrafast Spectroscopy and in Silico Study

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Abstract : Drug delivery to a target without adverse effects is one of the major criteria for clinical use. Herein, we have made an attempt to explore the delivery efficacy of SDS surfactant in a monomer and micellar stage during the delivery of the model drug, Toluidine Blue (TB) from the micellar cavity to DNA. Molecular recognition of pre-micellar SDS encapsulated TB with DNA occurs at a rate constant of $k_1 \sim 652 \text{ s}^{-1}$. However, no significant release of encapsulated TB at micellar concentration was observed within the experimental time frame. This originated from the higher binding affinity of TB towards the nano-cavity of SDS at micellar concentration which does not allow the delivery of TB from the nano-cavity of SDS micelles to DNA. Thus, molecular recognition controls the extent of DNA recognition by TB which in turn modulates the rate of delivery of TB from SDS in a concentration-dependent manner.

Keywords : DNA, drug delivery, micelle, pre-micelle, SDS, toluidine blue

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