

Encapsulation and release study of model drugs using photosensitive nano-carrier

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Amphiphilic copolymers tend to self assemble in different types of aggregates in which less soluble block is surrounded by ionic block of polymer. Hydrophobically modified polyelectrolytes are immensely reported as solubilizer for hydrophobic molecules in water. For this study, we have synthesized amphiphilic diblock copolymers ((EMAAB)_m-*b*-(GLBT)_n) of a carboxymethyl betaine (called GLBT) and 4-ethoxy-4'-methacrylamide (EMAAB) of different block ratios using reversible addition fragmentation chain transfer (RAFT) polymerization process. A systematic study has been performed in order to investigate solution and surface properties of copolymer in different pH solutions. Copolymers were observed to be self-assembled in the aqueous solution above a critical micelle concentration (CMC) which is determined by static light scattering measurements. Large hydrodynamic diameters of 140-160 nm suggest presence of vesicular structure which was confirmed by electric conductivity measurement. Polymer vesicles showed transition into micellar form when irradiated by UV light, which is observed by significant decrease in size of aggregates. Azobenzene block shows *trans* to *cis* isomerization on irradiation which is more polar form, it causes the distortion in self assembly and resulted to vesicle to micelle transition. (Figure 1 shows the schematic transition from vesicle to micelles) Solubilization capacity of copolymer solution has been measured using some water insoluble model drugs. Solubility of these drugs has been found to increased manifolds with polymer concentration. Decrease in solubility of these drugs has been observed with the UV irradiation which further confirms the phase transition of polymer aggregates. Therefore, we also have measured drug release with UV irradiation. This work gives implication that diblock copolymer (EMAAB)_m-*b*-(GLBT)_n can be used as a nano-carrier for photo sensitive drug release studies.

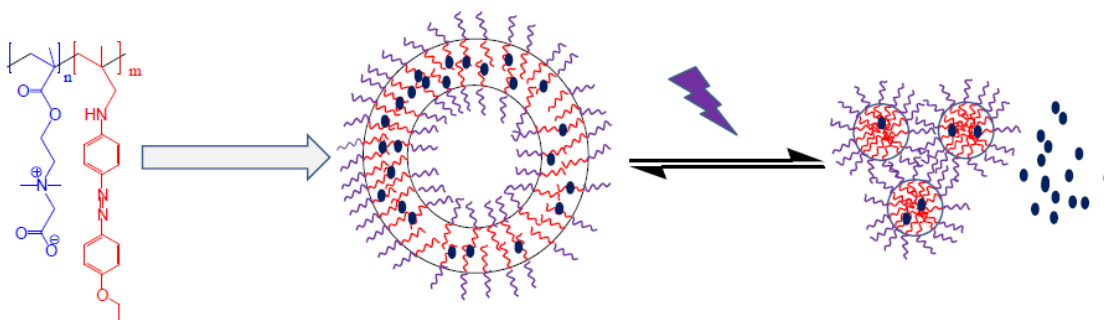


Figure 1. Schematic presentation of encapsulation and light triggered release of drugs by polymer vesicles.