Folding and Unfolding Control of Purple Membrane by Photoresponsive surfactants

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Purple membrane (PM) from Halobacterium salinarium was reversibly unfolded and refolded in the micelles of 4-Ethyl-4’(trimethylaminobutoxy) azobenzene bromide, which was the photoresponsive surfactant. The surfactant formed Trans form in the visible light and Cis form in the UV light. Fourier transform infrared and UV/VIS spectra of PM under different types of light were obtained in different concentrations of 4-Ethyl-4’(trimethylaminobutoxy) azobenzene bromide. In order to get the different spectra, two steps were followed: (1) PM unfolded under the visible illumination and (2) PM refolded under the UV shining. The process was done twice in order to get the reversibility of the folding and unfolding control. Different spectra of FTIR were compared under the two types of light. Our analysis showed the two spectra had no (or tiny) changes at 0, 2mM surfactant concentrations, big changes at 5, 10mM surfactant concentrations and small changes at 15, 20mM surfactant concentrations. PM with 10mM surfactant sample was taken as the example. The different spectra showed that under the UV light, the α-helix percentage increased while the unordered structure percentage decreased compared that under the visible light. The whole set of the experiments showed the unordered structure decreased under the UV shining, whereas the other structures increased. PM has more folded structures under the UV light than that under the visible light.