Controlled Self-Assembly Manipulated by Charge Transfer Interaction : From Tubes to vesicles

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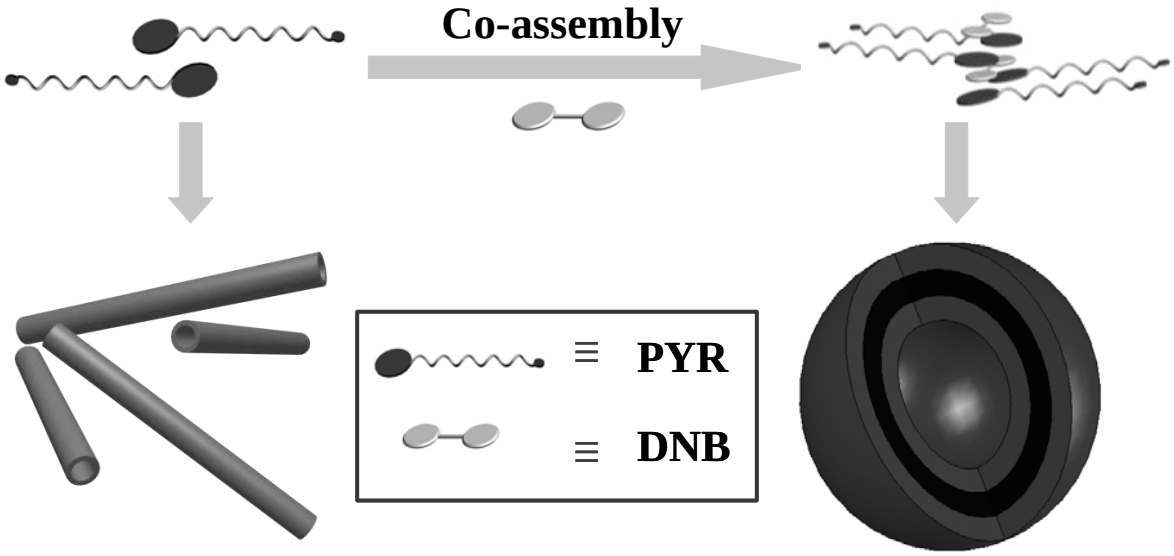
In this work, we reported a successful manipulation of the self-assembly nanostructures via noncovalent modification of the amphiphiles manipulated by charge transfer interaction, resulting in a transformation from fluorescent tubes to vesicles in aqueous media. The amphiphile (PYR) containing the electron-rich pyrenyl group was synthesized and it was found that PYR self-assembles into tubular structures. PYR was further complexed with ethane-1,2-diyl bis(3,5-dinitrobenzoate) (DNB) containing the electron deficient dinitrobenzyl group, forming a charge transfer complex. After complexation with DNB, the amphiphile self-assembles into vesicles, as confirmed by optical microscopy and transmission emission microscopy (TEM). The thickness of the bilayer was measured by X-ray diffraction (XRD). Based on these results, a curvature-dependent mechanism was proposed for the tube-vesicle transformation. Moreover, a series of control experiments were performed to confirm the mechanism. The results exemplify the enormous potential of self-assembly towards the controlled construction of well-defined nanostructures by domesticating the molecular building blocks. These findings provide a simple model spurring further understanding of the membrane deformation and micropatterning details in various cellular events. The intriguing ability of forming continuous tube-vesicle may potentially be used to fabricate artificial membranes with defined shape and controllable intervesicular transportation behaviors. [1]



[1] C. Wang, S. C. Yin, S. L. Chen, H. P. Xu, Z. Q. Wang and X. Zhang, *Angew. Chem. Int. Ed.* **2008**, anie200803361, in press.