Dual Activities of Small Molecule Microcapsule for Interaction with Protein and Drug Delivery

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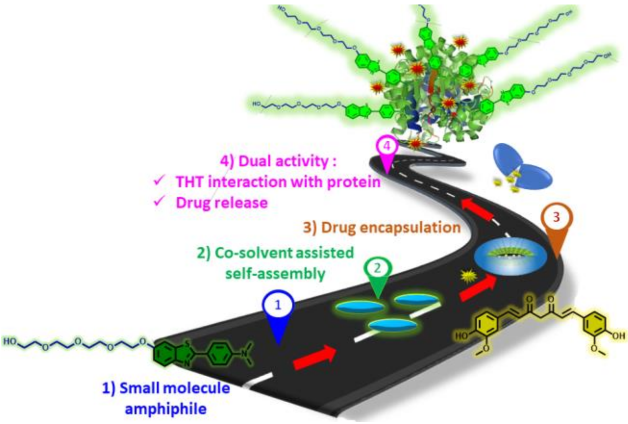
Abstract:

Molecular self-assembly based microstructure has emerged as a great topic of significance for strategically designed functional applications [1]. A well-defined macro structure based on small molecules for precisely acting as a drug carrier for controlled release and use as an imaging agent is rare in the literature [2]. Herein, we focus on a meticulously designed amphiphilic small molecule molecular rotor that can self-assemble to form a molecular vehicle for dual functional applications; (i) specificity-driven interaction with protein and imaging. (ii) drug encapsulation and controlled delivery (Figure 1A). We have synthesized an amphiphilic molecular rotor based on tetraethylene glycol and benzothiazole dye conjugate (TEG-BTA-2). Interestingly, TEG-BTA-2 forms aggregates by co-solvent assisted molecular self-assembly due to intermolecular π-π interaction exhibiting aggregation-induced emission (AIE) in H_2O:THF (Figure 1B). Fluorescence microscopy and SEM studies revealed capsule-like three-dimensional structures of aggregates ranging from 540 to 750 nm sizes (Figure 1C). The microcapsule was able to encapsulate hydrophobic drug that undergoes controlled drug release upon the addition of methanol and interacting with protein [3]. Chemical, photophysical characterization, optical microscopy of microcapsule, drug encapsulation, and control delivery triggered by specific interaction of TEG-BTA-2 with protein will be discussed in the poster presentation.

Figure/Scheme (if any):



References and Notes:

1. Shi, C.; Zhang, Q.; Tian, H.; Qu, D. *SmartMat.* **2020**, 1, 1.
2. Zhang, Q.; Deng, Y. X.; Luo, H. X.; Shi, C. Y.; Geise, G. M.; Feringa, B. L.; Tian, H.; Qu, D. H. *J Am Chem Soc.* **2019**, 141, 12804.
3. Zsila. F.; Samsonov, S. A.; Maszota-Zieleniak, M. *J Phys Chem B.* **2020**, 124, 11625.