Neutral Dye-TEG Amphiphiles as Photosensitizer and Bioimaging agents

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Abstract:
Polyethylene glycol (PEG) is a widely used amphiphilic polyether polymer covalently glued onto molecules to increase their hydrophilicity, biocompatibility, and inhibit immunogenicity. Herein, we synthesized two dyes having absorption in two different regions of the visible light spectrum and conjugated with tetraethylene glycol (TEG) for biologically important functional applications. A NIR class dye, Metallo-phthalocyanine (MPc(TEG)$_4$) consisting of four tetraethylene glycols covalently attached to four peripheral positions was synthesized. The resultant amphiphilic MPc(TEG)$_4$ dye is soluble in both organic solvent and aqueous medium devoid of molecular aggregation leading to an excellent photo-sensitizer (Fig. 1). In addition, benzothiazole class of dye, a neutral Thioflavin-T [2-(4´,4'–dimethylaminophenyl)benzothiazole, BTA-2] covalently attached to the tetraethylene glycol (TEG-BTA-2) was synthesized. Conjugation of a TEG molecule enables the neutral TEG-BTA-2 amphiphile to exhibit aggregation-induced emission (AIE) in the water-THF system making a potential neutral amphiphilic dye candidate for bioimaging application (Fig. 2). Synthesis, photophysical properties of both the dyes MPc(TEG)$_4$ and TEG-BTA-2, detailed investigation on the photo-dynamic property of MPc-TEG$_4$ for self-sterilizing and self-cleaning applications; AIE behaviour of TEG-BTA-2 and bioimaging application will be presented in the poster.

Figure/Scheme (if any):

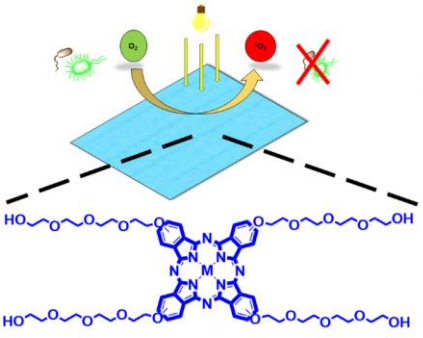

Figure. 1. MPc(TEG)$_4$ photosensitizer dyed self-sterilizing and self-cleaning cotton fabric.

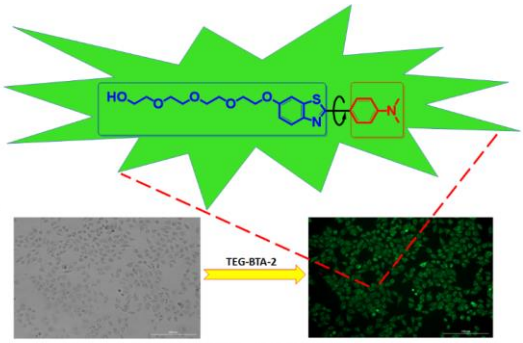

Figure. 2. TEG-BTA-2 conjugate amphiphile as a bioimaging agent for cancer cell.

References and Notes:

1. Verhoef, J. J. F.; Anchordoquy, T. J. *Drug Deliv. Transl. Res.* **2013**, 3, 499–503.
2. Lo, P. C.; Rodríguez-Morgade, M. S.; Pandey, R. K.; Ng, D. K. P.; Torres, T.; Dumoulin, F. *Chem. Soc. Rev.* **2020**, 49, 1041–1056.
3. Tuncel, S.; Dumoulin, F.; Gailer, J.; Sooriyaarachchi, M.; Atilla, D.; Durmuş, M.; Bouchu, D.; Savoie, H.; Boyle, R. W.; Ahsen, V. *J. Chem. Soc. Dalt. Trans.* **2011**, 40, 4067–4079.
4. Qin, L.; Vastl, J.; Gao, *J. Mol. Biosyst.* **2010**, 6, 1791–1795.