Bacteria-Visualizing Nano-Bactericide for *in situ* NIR Phototherapeutic Anti-Inflammation and Wound Healing

Synthesis of SiPc-NH_2[1]

Silicon phthalocyanine dichloride ($SiPcCl_2$) (200 mg, 0.33 mmol), 2-(2-aminoethoxy) ethanol (1 mL, 9.9 mmol), K_2CO_3 (200 mg, 1.45 mmol), and pyridine (2 mL) were dissolved in dry toluene (40 mL). The reaction mixture was heated and refluxed at 130℃ for 12 h under nitrogen atmosphere. After evaporating the solvent in vacuo, the residue was redissolved in $CHCl_3$ and washed three times with deionized water (100 mL). After concentration, the crud product was recrystallized from chloroform/n-hexane to give SiPc-NH_2 as a blue solid (110 mg，44.5%). ^{1}H NMR (CD_3OD, 300 MHz): δ = 9.76-9.70 (8H, m, Pc-H_α), 8.54-8.44 (8H, m, Pc-H_β), 1.90-1.88 (4H, t, CH_2), 1.81 – 1.74 (4H, t, CH_2), 0.58-0.56 (4H, t, CH_2), 1.84 (4H, t, CH_2).

Photothermal conversion efficiency of SiPc-CMCS

To evaluate the photothermal conversion capability of SiPc-CMCS, 3 mL aqueous solution of SiPc-CMCS was added into cuvette and continuously irradiated for 10 min with the 808 nm laser at a power of 1.5 W/cm^{-2} and cooling 10 min, and the temperature change was recorded by the near infrared thermal imager. The photothermal conversion efficiency (PCE) was calculated according to the following equations.

$$\eta = \frac{hs(T_{max} - T_{surr}) - Q_{dis}}{I(1 - 10^{-A})}$$

Where h is the heat transfer coefficient; s is the surface area of the container. Q_{dis} represents heat dissipated from the laser mediated by the solvent and container. I is the laser power and A is the absorbance at 808 nm.

$$hs = \frac{mC}{\tau_s}$$

m is the mass of the solution containing the photoactive material, C is the specific heat capacity of the solution and τ_s is the associated time constant.

$$t = -\tau_S \ln(\theta)$$

θ is a dimensionless parameter, known as the driving force temperature.

$$\theta = \frac{T - T_{surr}}{T_{max} - T_{surr}}$$

T_{max} and T_{surr} are the maximum steady state temperature and the environmental temperature, respectively.[2]

References

1. J. Pan, A. Ouyang, W. Fang, G. Cheng, W. Liu, F. Wang, D. Zhao, K. Le and J. Jiang, *J Mater Chem B*, 2020, 8, 2895-2908. DOI: 10.1039/D0TB00192A.
2. J. Li, J. Wang, J. Zhang, T. Han, X. Hu, M. M. S. Lee, D. Wang and B. Z. Tang, *Adv. Mater.* 2021, 33, 2105999. DOI: 10.1002/adma.202105999.