

A NIR-II theranostics nanoprobe for tumor diagnosis and image-guided therapy

With the support by the National Natural Science Foundation of China and the National Key R&D Program, the research team led by Prof. Sun Yao, Prof. Li HaiBing and Prof. Yang GuangFu (杨光富) at the Laboratory of Pesticide & Chemical Biology, Ministry of Education, Central China Normal University, cooperated with the research team led by Prof. Peter J. Stang from the University of Utah, and developed a novel NIR-II nanoprobe for tumor diagnosis and evaluation of anti-tumor efficiency, which was published in *PNAS* (2019, 116: 1968—1973).

Real-time monitoring and assessment of the dynamic changes in tumor pathology during cancer treatment are the basis for achieving precision medicine. Therefore, fluorescent probes integrating diagnostic and therapeutic play a key role in this field. The team designed and synthesized a novel fluorescent molecule SY1100 with high temporal and spatial resolution (emission wavelength of 1100 nm, in the second near-infrared window), and developed a supramolecular metal-based coordination complex with high anti-tumor activity and high *in vivo* stability. Subsequently, the liposome coating technology based on DSPE-mPEG5000 was used to prepare the first fluorescent nanoprobe with the macrocyclic Pt structure for tumor diagnosis and treatment. The results showed that the nanoprobe has good light stability, passive targeting ability and high resolution, which can not only achieve accurate diagnosis of cancer, but also selectively release macrocyclic platinum compounds which possess high antitumor activity in tumor tissues.

The design strategy of the probe can provide reference for the precise and controlled release of targeted anti-tumor drugs, pharmacokinetic studies and the advance of precise monitoring technology for tumor development, and promote the procedure of a targeted anti-tumor drug from laboratory to clinical application with a more accurate means of biopsy analysis.

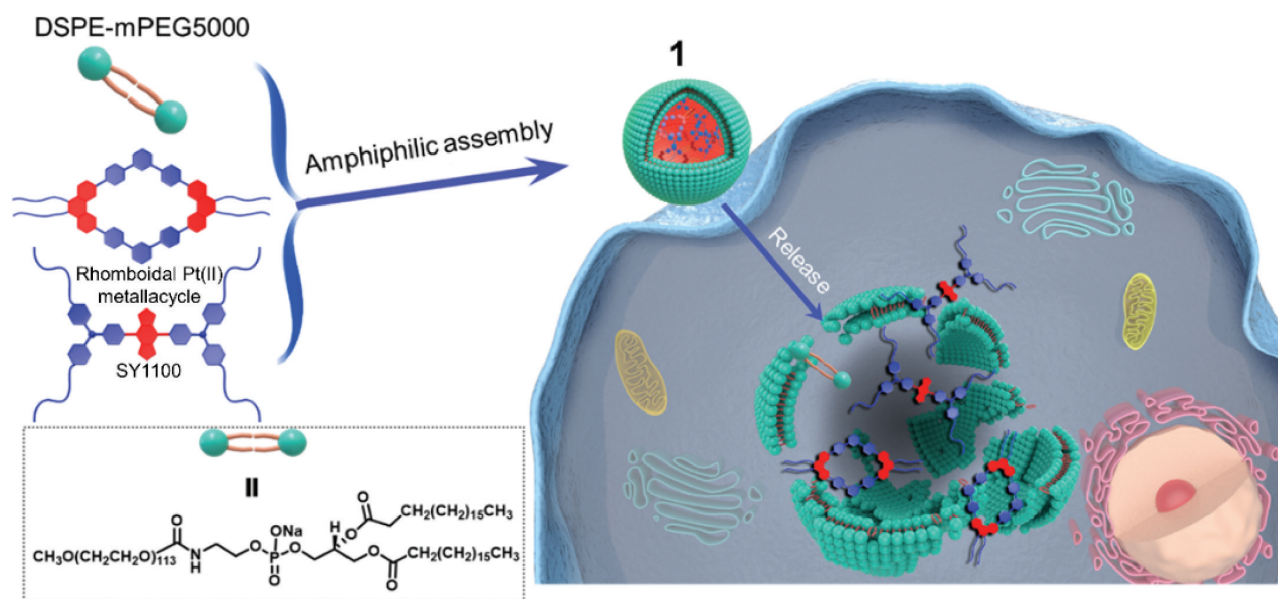


Figure Cartoon illustration of the cellular uptake of rhomboidal Pt(II) metallacycle from nanoprobe 1.