Theranostics Lanthanide Bioprobes for Combating Cancer Diseases

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Lanthanide complexes have been widely utilized as imaging agents such as MRI contrast agents or luminescence labelling for decades. In recent years however, concerns have developed about their toxicity, believed to derive from demetallation of the complexes in vivo, and the relatively large quantities of compound required for a successful scan. Recent efforts have sought to enhance the relaxivity of trivalent gadolinium complexes or emission quantum efficiency of terbium/europium complexes without sacrificing their stability. This seminar aims to show the strategic design of ligands synthesized for this purpose, provide an overview of our recent development/strategies (i.e. molecular upconversion, thermal sensing, triboluminescence and photo-activated drug delivery) in lanthanide-based bioprobes targeting some biological small molecules or proteins for cancer imaging and therapy.

Reference:

1. S. Zha, H.-F. Chau, W. Y. Chau, L. S. Chan, J. L., K. W. Lo, W. C.-S. Cho, Y. L. Yip, S. W. Tsao, P. J. Farrell, J. M. Di,* G.-L. Law,* H. L. Lung,* and **K-L Wong**,* 'Dual-targeting peptide-guided approach for precision delivery and cancer monitoring by using a safe upconversion nanoplatform', *Advanced Science*, (2021) 2002919.
2. Y. Wu, H.-F. Chau, W. Thor, K. H. Y. Chan, X. Ma, W.-L. Chan,* N. J. Long,* and **K.-L. Wong**,* 'Solid-phase peptide macrocyclization and multifunctionalization via dipyrrin construction', *Angewandte Chemie International Edition*, (2021) 133, 20463-20469.
3. W. Thor, Y. Wu, L. Wang, Y. Zhang, P. A. Tanner,* and **K.-L. Wong,*** 'First reported charging and ultralong phosphorescence of lanthanide facilitated organic complex', *Nature Communications*, (2021) 12, 1-9.
4. W.-L. Chan, C. Xie, W.-S. Lo, J.-C. G. Bünzli,* W.-K. Wong*, and **K.-L. Wong**,* 'Lanthanide–tetrapyrrole complexes: syntheses, redox chemistry, photophysical properties, and photonic applications', *Chemical Society Review*, (2021) 50, 12189-12257.

Ka-Leung Wong obtained his Chemistry BSc at City University of Hong Kong in 2002 and PhD at The University of Hong Kong in 2006. He pursued this postdoc work in Durham University with Prof. David Parker FRS with the support of Royal Society Incoming Fellowship. He started his independent research at Hong Kong Baptist University in 2011 and promoted to be a chair professor in 2021. He has published more than 165 papers, including Nature Sister Journals, LSA, PNAS, Angew. Chemie and JACS (h index = 51, citation >6500), awarded 2015 ERES Junior award from The European Rare Earth and Actinide Society and The Ministry of Education, second-class award at the Higher Education Outstanding Scientific Research Output Awards 2020 (Science and Technology). His research interests include image guided cancer therapy, lanthanide chemistry and spectroscopy. He is served as an editor in Journal of Luminescence (Elsevier) and international advisory board member in ChemPlusChem (Wiley).