Lanthanide(III)/gallium(III) and lanthanide(III)/zinc(II) metallacrowns for near-infrared luminescence and photoacoustic imaging

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Optical imaging is an essential technique to gather insights into anatomical structures and physiological activities of living organisms that opens new avenues in biomedical research and medical diagnostic.[1] Among the different types of novel optical imaging modalities, near-infrared (NIR) luminescence and photoacoustic (PA) imaging have attracted an increasing attention. Each technique possesses specific advantages: NIR luminescence is extremely sensitive and allows the acquisition of images with high resolution at the cellular level while PA imaging provides higher detection depth. Both techniques require specific imaging agents which exhibit large molar absorption coefficients, ideally in the range of the biological transparency window (650-1700 nm). Lanthanide(III)-based molecular compounds, due to their unique luminescence properties, can provide complementary advantages when used as agents for optical imaging.[2,3] In this presentation we will discuss peculiarities of the design and synthesis of lanthanide(III)/zinc(II)[4-7] and lanthanide(III)/gallium(III)[8-12] metallacrowns as probes for NIR luminescence and PA imaging. Different functionalization strategies to tune the solubility/biocompatibility and the excitation wavelength of these lanthanide(III)-based molecular compounds will be discussed, Namely, the synthesis of dendritic metallacrowns, the covalent coupling with organic chromophores or the formation of ion-associated metallacrowns will be described.

Acknowledgement: The research leading to these results was supported in part by the National Science Foundation, La Ligue Régionale contre le Cancer, comités du Loiret et d'Eure-et-Loir, the network "Molécules marines, métabolisme et cancer" from the Canceropôle Grand Ouest, and la Region Centre Val-de-Loire. S.P. acknowledges support from the Institut National de la Sante et de la Recherche Medicale (INSERM). A.K. and C.C.B.S. acknowledge support from l'Université d'Orléans.

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