Shining a light on bacteria: lanthanide-based glycoconjugate molecular sensors for lectins

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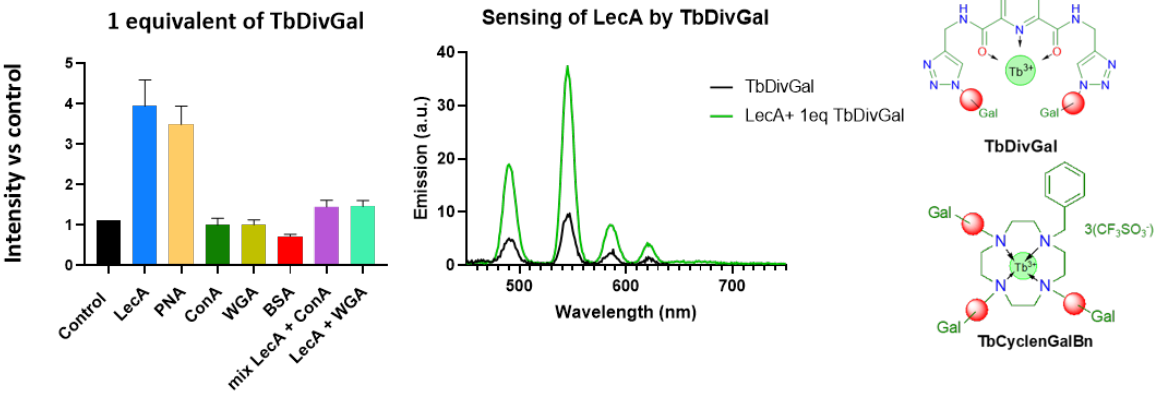
Lanthanide probes are advantageous for sensing applications due to their characteristic and time-resolved emission spectra, which can be easily distinguished from background fluorescence of biological samples.[1] Many pathogenic bacteria such as *Pseudomonas aeruginosa* (PA) produce lectins which present viable targets for detection, as well as for new therapies. Diagnostic methods for bacterial infections rely on cell culture, leading to delays in targeted treatment. New detection methods are needed in the fight against antimicrobial resistance. This project aims to use the selective nature of carbohydrate-lectin interactions to develop visually responsive glycoconjugate probes, which would be suitable for diagnosis of infections, such as by PA, a bacterium classified as a Priority 1 pathogen by the WHO.[2] LecA and LecB are lectins on the surface of PA with high affinity for galactoside and fucoside glycans respectively.[3] Many approaches have been developed to inhibit the binding of these lectins to human tissue cells by the development of inhibitory glycoconjugates with varying degrees of success.[4] Here we report two generations of multivalent glycoconjugate lanthanide complexes, featuring different architectures, which demonstrate enhanced emission in the presence of relevant lectins as divalent and tetravalent systems. Integration of these systems into smart materials has potential for application in the medical devices industry. We also present a series of transition-metal glycoconjugates which have been tested for biological activity against PA and *Candida albicans*.



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