New boranil-based antennae for photoswitchable luminescent lanthanide (III) complexes

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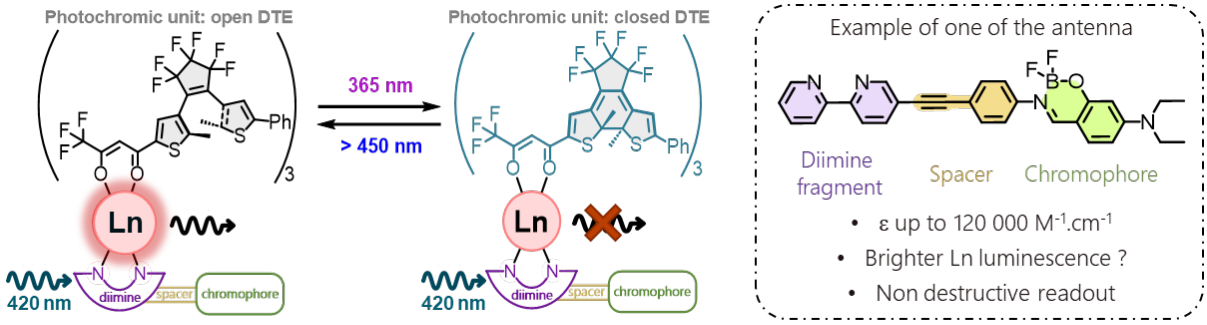
Counterfeiting is a global problem that challenges businesses, governments, and consumers. To develop novel anti-counterfeiting systems, lanthanide-based complexes are widely used due to their original emission features such as long lived and narrow bandwidth luminescence from the visible up to the near infrared spectral range.[1a-b] To obtain innovative signatures, the challenge is now to add new features to these complexes luminescence thanks to in deepth comprehension of the molecular design.

Our group recently made a major breakthrough in this field by designing a lanthanide complex which NIR luminescence can be turned on or off at will, with the use of an external photostimulation.[2] Light control is achieved with a dithienylethene (DTE) moiety, capable to quench the luminescence of the complex by energy transfer in only one of its two states.[3] However these systems suffer from a moderate brightness.

Our goal is now to design new switchable complexes with a significant brightness improvement, a high on/off intensity ratio and an excitation in the visible range in order to meet the standards required for applications. Here, we present the synthesis of new boranil-based lanthanide complexes with high molar absorption coefficient (up to 120 000 $M^{-1}.cm^{-1}$) designed to enhance light absorption at visible wavelengths.[4] The photophysical results shine light on these boranyl chromophore abilities to sensitize lanthanide emission in the NIR (Ln = Yb) and to provide a non-destructive readout.



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