New Antennae Ligands for Lanthanide Cations Emitting in the NIR.

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Lanthanide complexes using tropolonate ligands that exhibit efficient luminescence in the near-infrared region have been developed for their potential application in high resolution biological imaging. Near-infrared (NIR) light can penetrate deeply into tissues without damaging biological systems and with limited light scattering. In comparison to NIR organic fluorophores, luminescent lanthanide complexes do not photobleach and can be easily discriminated from background fluorescence temporally and spectrally through their long luminescence lifetimes and sharp emission bands.

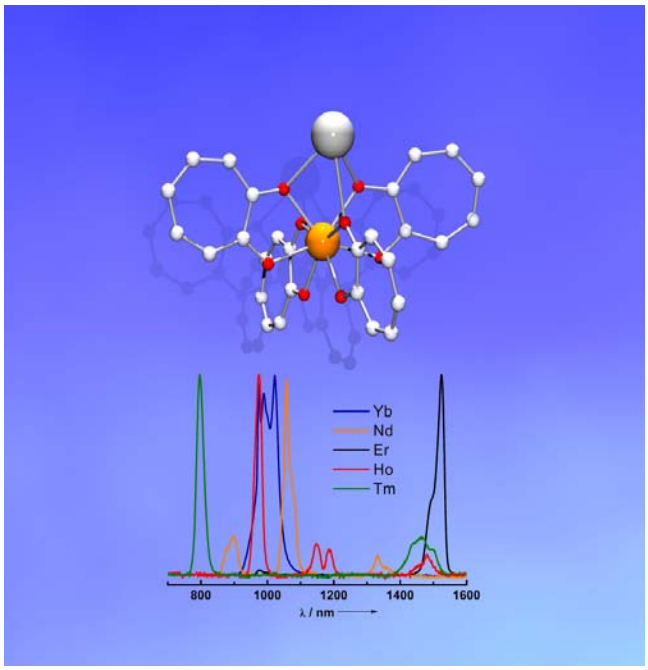

Figure 1 *Crystal structure of $[Yb(Trop)_4]^-$ and Normalized emission spectra for complexes in DMSO solution.*

Tropolonate, a seven-membered ring oxygen donor chelator was used as a sensitizer for NIR lanthanide complexes. The $[Ln(Trop)_4]^-$ (Ln = La-Lu) complexes were synthesized, and several single crystal structures of $K[Ln(Trop)_4]^-$ are reported and discussed. The formation of the complexes in solution has been studied. The NIR luminescence from several lanthanide complexes (Ln = Yb, Nd, Er, Ho and Tm) were fully investigated. These results indicate that tropolonate ligands are able to sensitize several lanthanide cations that emit in the near-infrared domain. Also, the luminescence of Ho^{3+} in a lanthanide complex in solution is reported here. Quantum yields of the complexes formed with Yb^{3+} are comparable to the highest reported quantum yields of other lanthanide complexes that emit in the NIR domain.