Fall 11-11-2024

Protonation of Terbium Complexes as a Possible Chemical Sensor

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Upon ultraviolet excitation, terbium(III)-ligand complexes exhibit strong yellow-green fluorescence in accordance with the antenna effect. Recent studies in our laboratory show remarkable quenching of the emission signature upon exposure of homoleptic complexes to water or mineral acids. The changes are completely reversible under mild conditions, suggesting possible applications as a chemical sensor. Following the synthesis of $[Tb(pydm)_3](NO_3)_3$ (pydm = 2,6-pyridine dimethanol), the complex was titrated with HCl and the changing absorption spectra of the complex was monitored through ultraviolet-visible spectroscopy. Further, we have purified and characterized this product through ^{1}H-NMR and ^{13}C-NMR. A deeper understanding of the reactions causing the quenching of the emission upon exposure to water will aid the intelligent design of chemical sensors.