

NOVEL METAL-BASED LUMINESCENCE ION PROBES

Vivian Wing-Wah Yam

Department of Chemistry, The University of Hong Kong,
Pokfulam Road, Hong Kong, P.R. China

The search for host molecules which could selectively recognize specific guest molecules at their receptor site and produce a measurable physical change is a current issue of immense interest. Spectroscopic detection of ions and molecules of environmental and biological interests is of great importance both in classical analytical chemistry and in the molecular design of sensors involving optical signal transformation. The utilization of the inherently sensitive nature of luminescence signalling has been particularly attractive. Ion-controlled luminescence probes are of interest for ion sensing as well as for the construction of molecular optoelectronic "on-off" switching devices.

In this presentation, we wish to report the design and synthesis of several classes of transition metal complexes containing ligands functionalized with receptor sites, which have been shown to function as selective and specific spectrochemical / luminescence chemosensors for ions.¹⁻⁴ The binding characteristics have been studied by both uv-visible and emission spectroscopic measurements. A versatile luminescence ion probe system for potassium ions based on the switching on and off of metal...metal interactions will also be described.⁵ The red luminescence of the dinuclear gold(I) complexes $[\text{Au}_2(\text{dppm})(\text{S-benzo-15-crown-5})_2]$ and $[\text{Au}_2(\text{dcpm})(\text{S-benzo-15-crown-5})_2]$ are found to be switched on upon addition of K^+ ions. The binding characteristics have been studied by both uv-visible and emission spectroscopic measurements. The identities of the bound species have been confirmed by mass spectrometric studies. The present system not only serves as a molecular phosphorescent signalling ion sensor and a molecular optoelectronic switch, but also provides spectroscopic evidence for potassium ion induced gold...gold interactions.

References

- [1] Yam, V.W.W.; Lo, K.K.W.; Cheung, K.K. *Inorg. Chem.*, 1995, 34, 4013. Yam, V.W.W.; Pui, Y.L.; Li, W.P.; Lo, K.K.W.; Cheung, K.K. *J. Chem. Soc., Dalton Trans.*, 1998, 3615.
- [2] Yam, V.W.W.; Wong, K.M.C.; Lee, V.W.M.; Lo, K.K.W.; Cheung, K.K. *Organometallics*, 1995, 14, 4034.
- [3] Yam, V.W.W.; Lee, V.W.M.; Cheung, K.K.; Ke, F.; Siu, K.W.M. *Inorg. Chem.*, 1997, 36, 2124.
- [4] Yam, V.W.W.; Lee, V.W.M. *J. Chem. Soc., Dalton Trans.*, 1997, 3005.
- [5] Yam, V.W.W.; Li, C.K.; Chan, C.L. *Angew. Chem., Int. Ed. Engl.*, 1998, 37, 2857.