

Chemical sensors for chemical warfare agents

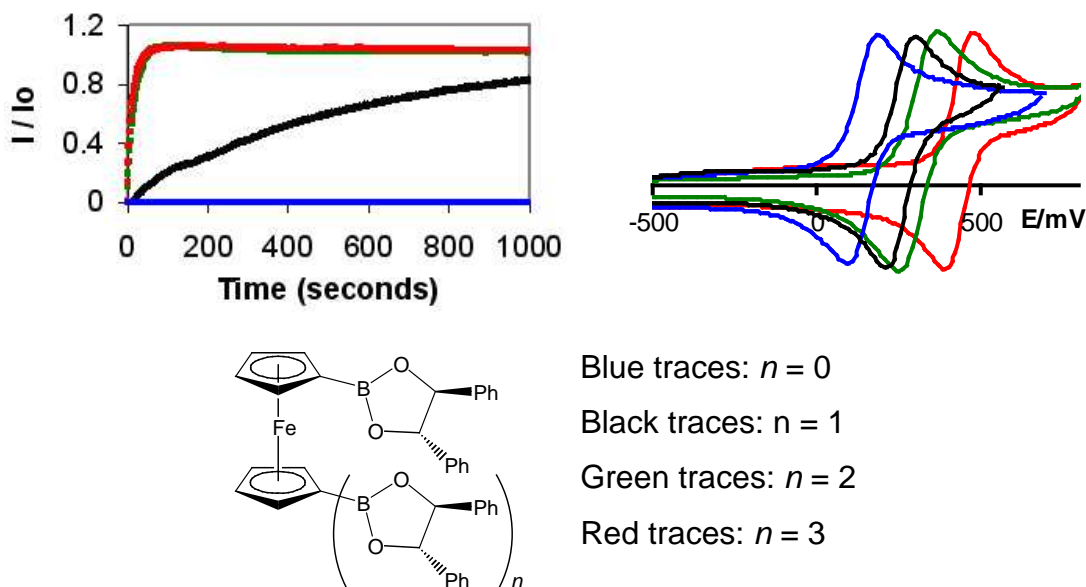
Simon Aldridge^a and Ian A Fallis^b

^a Inorganic Chemistry, South Parks Road, Oxford, UK, OX1 3QR

^b Cardiff School of Chemistry, Main Building, Park Place, Cardiff, UK, CF10 3AT

In recent work we have examined specific sensor chemistries for a range of chemical warfare agents (CWAs). In particular, we have extensively studied air-stable organometallic Lewis acids which display highly selective binding of fluoride (and hydrogen fluoride) as a means of detecting fluorinated organophosphorus agents such as Sarin (GB), Soman (GD) and Cyclosarin (GF).[†] Related work has targeted cyanide-containing agents, such as HCN and Tabun (GA). The underlying basis of the system is selective binding of the target analyte in the presence of potentially competitive species. Furthermore, this process can be shown to change the electronic environment within the receptor molecule such that the iron atom at the core can be oxidized by atmospheric oxygen, so bringing about an orange to green colour change. Examples of the type of receptor compound involved are shown below.

Extension of this work has shown that, by adopting a modular approach to the construction of these sensors, their electronic properties may be tuned systematically in order to exert control over reaction kinetics and hence improve the *rate of sensor response*. Moreover, by coupling the iron-centred redox chemistry with a suitable organic dye, massive signal enhancement can be brought about, thereby dramatically increasing levels of *sensitivity*.



[†] C. Bresner, S. Aldridge, I. A. Fallis, C. Jones, L. L. Ooi, *Angew. Chem., Int. Ed.*, 2005, 44, 3606.