Stable Single-Ion Sources of Iron(I)

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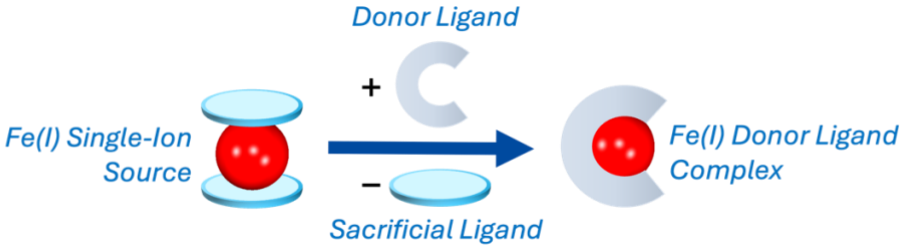
Soluble organometallic complexes which are capable of delivering the metal atom, or mono-cation through facile, redox-neutral ligand exchange have been well-studied for over half a century. Representative examples of these include: $[Rh(cod)_2][BF_4]$, $[Ni(cod)_2]$, and $[Pd_2(dba)_3]$. This chemical technology has become one of the key the methods of choice when synthesising well-defined low oxidation state complexes and indispensable in catalytic systems for providing the transition metal source.[1–4]

Although iron(+I) has been long postulated as the lowest oxidation state in many catalytic reactions,[5–11] isolated examples of the monocation are still very rare, and there are currently no known examples of iron(+I) complexes which can selectively transfer the cation to donor ligands.[12] Therefore, to utilise such species in catalysis, one typically reacts a pre-ligated iron(+II) or (+III) halide complex with a strong alkali or alkaline earth metal-based reductant.[10] When this is done *in situ*, it often leaves the catalyst ill-defined and reduces the functional group tolerance of the reaction mixture.



We have synthesised the first examples of iron(I) single-ion sources and demonstrate how they can provide facile access to a library of iron(I) complexes with well-studied and commercially available ligands through redox-neutral ligand exchange.

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