

# SELECTIVE METAL ION EXTRACTION USING SUPERCRITICAL CARBON DIOXIDE

*Jeremy D. Glennon, Anne M. O'Keeffe, Niamh M. Curran, Josephine Treacy,  
Conor C. McSweeney, Mark O'Connell and David Cocker.*

Analytical Chemistry and Supercritical Fluid Centre, Department of Chemistry,  
University College Cork, Cork, Ireland. [Email [j.glennon@ucc.ie](mailto:j.glennon@ucc.ie) ]

While the beneficial role of essential metal ions in biological systems is universally recognised, there is increasing recognition of the importance of controlling the level and degree of exposure to toxic metals in our biological and environmental systems. Thus, supercritical fluid extraction of metal ions has received considerable attention at both analytical and process scales.

The synthesis and design of novel macrocyclic reagents capable of complexing and extracting transition metal ions, including gold, in sc-CO<sub>2</sub>, without the need for an organic modifier has been demonstrated. These molecular baskets with fluorinated side chains on the upper rim (to aid solubility in the sc-fluid), are calix[4]arene derivatives, functionalized at the lower rim with suitable donor atoms around a fixed cavity size to yield highly selective metal complexation. In addition, a series of linear hydroxamic acid derivatives are reported as highly efficient chelating agents in the solubilization and extraction of Fe(III) from various matrices.