

N°83 / OC

TOPIC(s) : Waste valorization / Alternative technologies

## Micellar catalysis using recovered metals

### AUTHORS

Valentin LACANAU / ICSM, BÂT 426 - BP 17171, BAGNOLS SUR CEZE

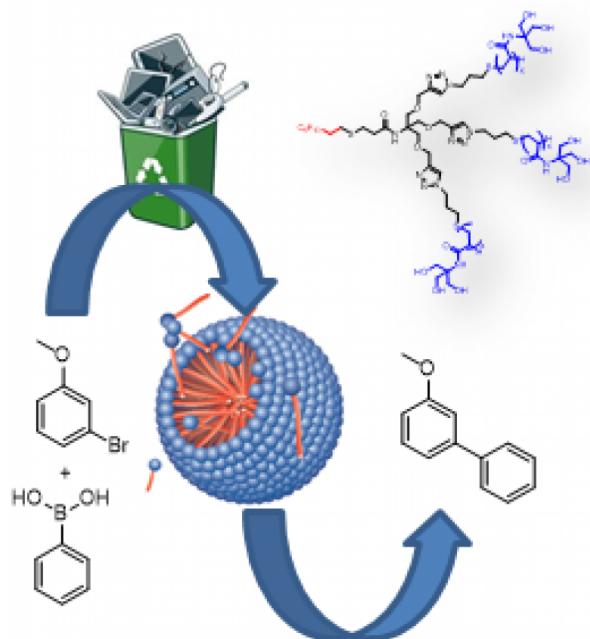
### PURPOSE OF THE ABSTRACT

As our economy faces more and more metals supply risks, the recovery of palladium (Pd) from Waste of Electrical and Electronic Equipment (WEEE) is an activity in which the LHYS (Laboratory of Hybrid System for Separation) at ICSM (Marcoule Institute for Separative Chemistry) is deeply involved [1]. The recovered Pd can be used for micellar catalysis, a technique which consists of replacing synthetic solvents by water containing low concentrations of surfactants. These surfactants allow the solubilization of chemicals in water and to carry out different types of cross-coupling reactions such as Suzuki, Heck or Buchwald [2, 3].

Different tailor-made amphiphilic surfactants endowed with polymeric and dendronic TAC heads (derived from a Tris-Acrylamide polymerizable monomer [4]) have been designed and synthesized and their efficacy to extract Pd(II) has been tested and compared with the standard one used for micellar catalysis, TPSSG-750M.

The self-assembly in water of the prepared amphiphiles with and without Pd was fully characterized (form and structure factor, size, shape ?) using SAXS. Structural analysis performed with NMR demonstrated the preferential Pd(II) coordination by the polyhydroxylated chains. Altogether, a mechanism for Pd stabilization during L/L extraction and for micellar catalysis in the nanoreactor can be proposed. All our results will be detailed, including the complete proof of concept going from used electronic components to Suzuki coupling in water (Fig. 1).

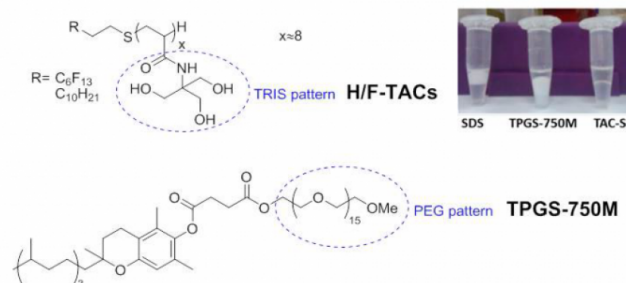
## FIGURES



**FIGURE 1**

Fig.1:

Combination of WEEEs recycling and micellar catalysis.



**FIGURE 2**

Commercial vs "homemade" surfactants

TACs-surfactants enable clean phase separation and Pd stabilization while commercial ones foam during L/L extraction step

## KEYWORDS

Surfactant | Palladium | Recovery | WEEE

## BIBLIOGRAPHY

1. R. Poirot, D. Bourgeois, D. Meyer, Solvent Extr. Ion Exch., 32, 529-542 (2014)
2. B. Lipshutz, S. Ghoraib, Aldrichimica Acta, 41, 59 (2008)
3. P. Wagner, M. Bollenbach, C. Doebelin, F. Bihel, J.J. Bourguignon, C. Salomé, M. Schmitt, Green Chem., 16, 4170-4178 (2014)
4. K. Astafyeva, L. Somaglino, S. Desgranges, R. Salomir, A. Polidori, C. Contino-Pépin, N. Taulier, J. Mater. Chem. B, 3, 2892-2907 (2015)