

Ion Separation by Self-Assembled Molecular Systems

Laboratoire du Tri Ionique par des Systèmes Moléculaires auto-assemblés (LTSM)



Permanent team

Sandrine DOURDAIN (CEA)
Beatrice BAUS-LAGARDE (CEA)
Guilhem ARRACHART (UM)
Fabrice GUISTI (CNRS)
Thomas ZEMB (CEA)
Stéphane PELLET-ROSTAING (CNRS)

Design, synthesis and studies of specific ligands and materials for ion extraction and separation.
Focus on the understanding of the molecular and supramolecular mechanisms governing affinity and selectivity.

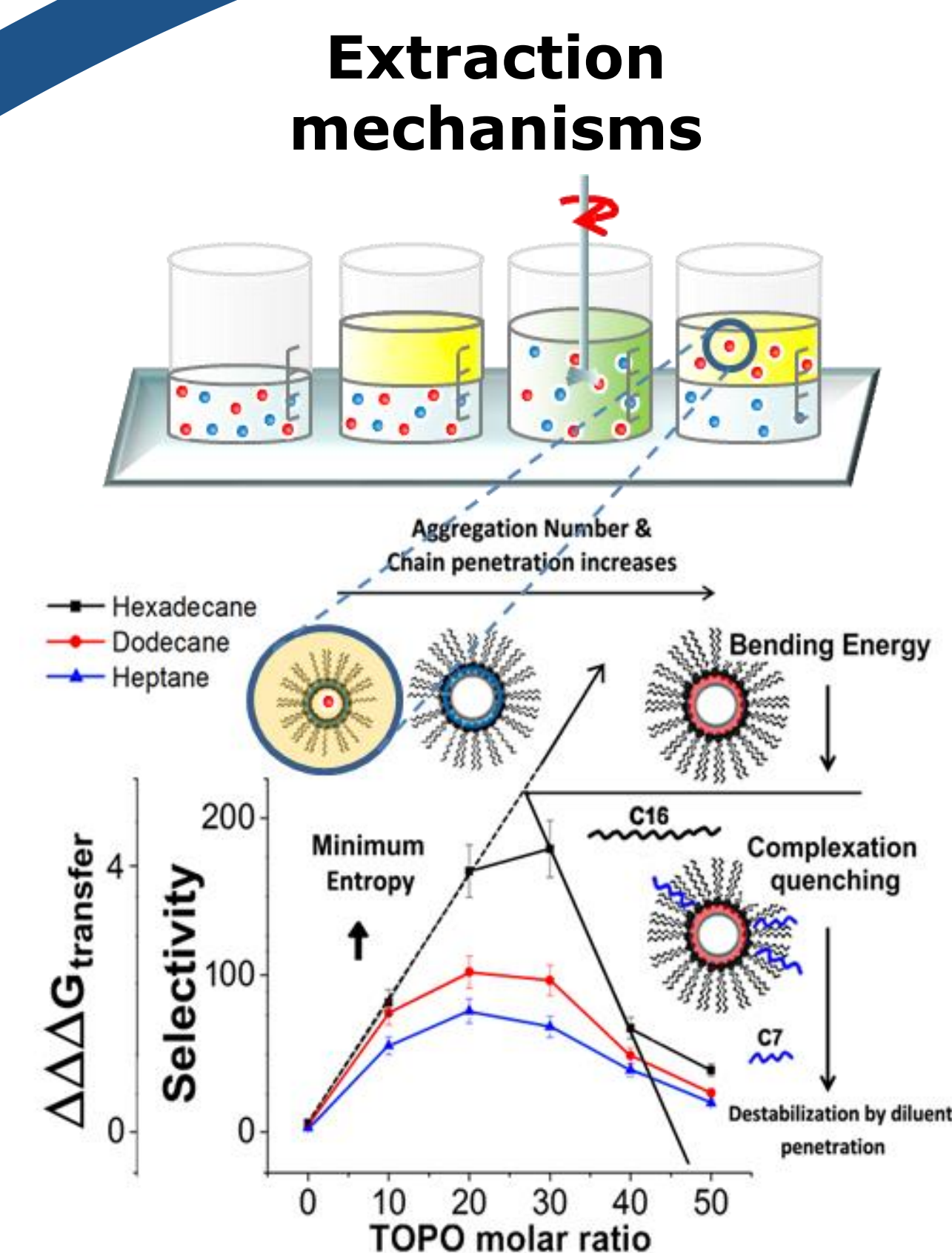
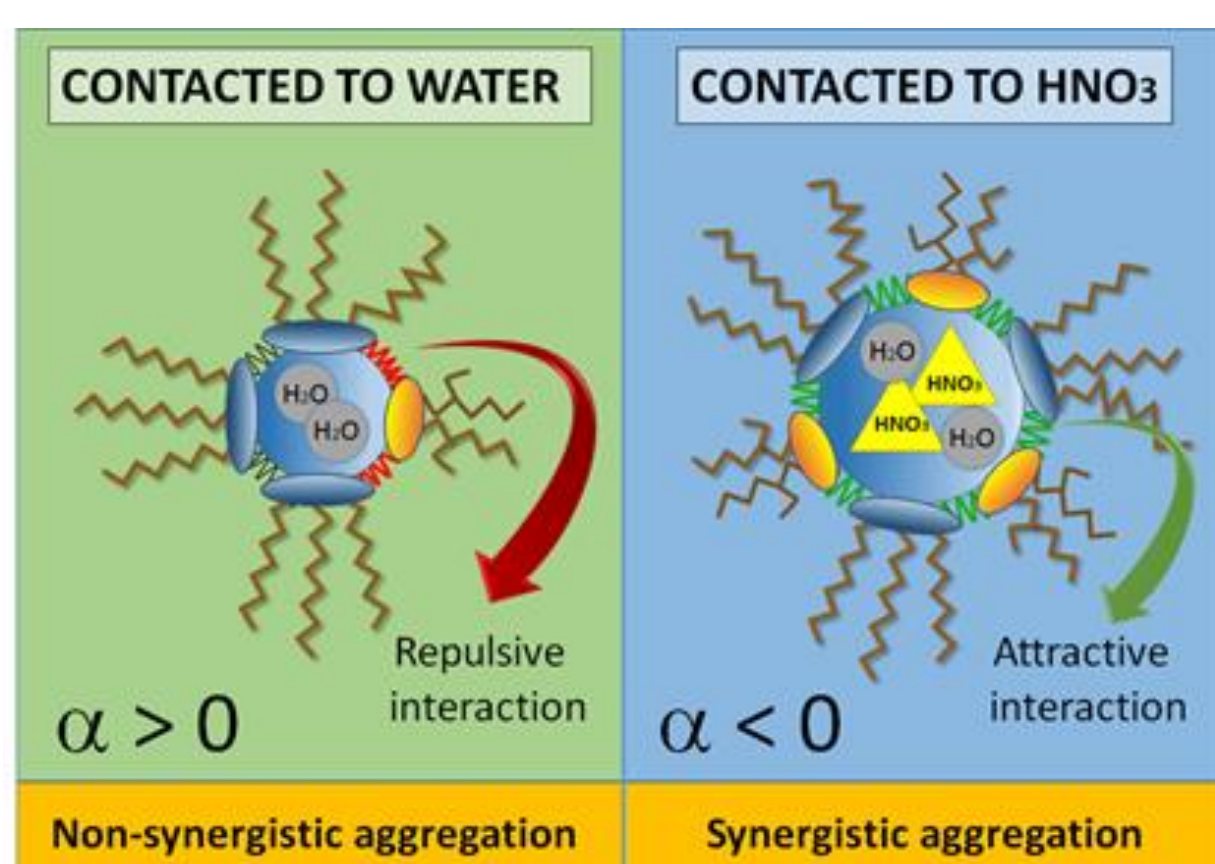
Understanding mechanisms

Solvent extraction
Synergistic effects

Supramolecular aggregation

Effect of self-assembly of extractant molecules on extraction (SAXS, SANS measurement...)

Synergistic effects



Thermodynamic investigation of synergy in solvent extraction

Understanding and Optimization

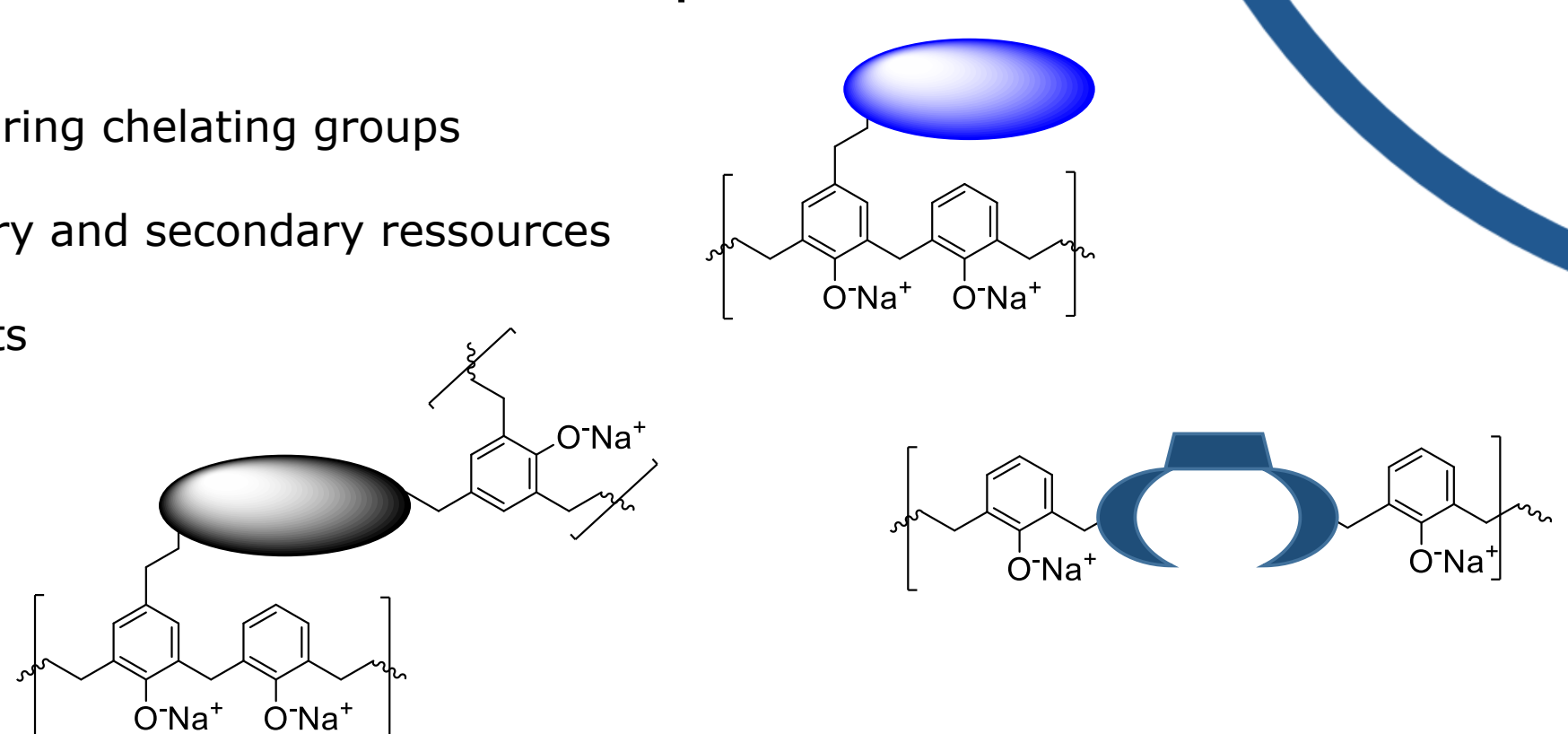
Ion Extraction/Separation by Self-assembled Systems in Conventional and Unconventional Processes

Chelating organic resins :

- Synthesis of chelating ion exchange resins
- Extraction and decontamination processes

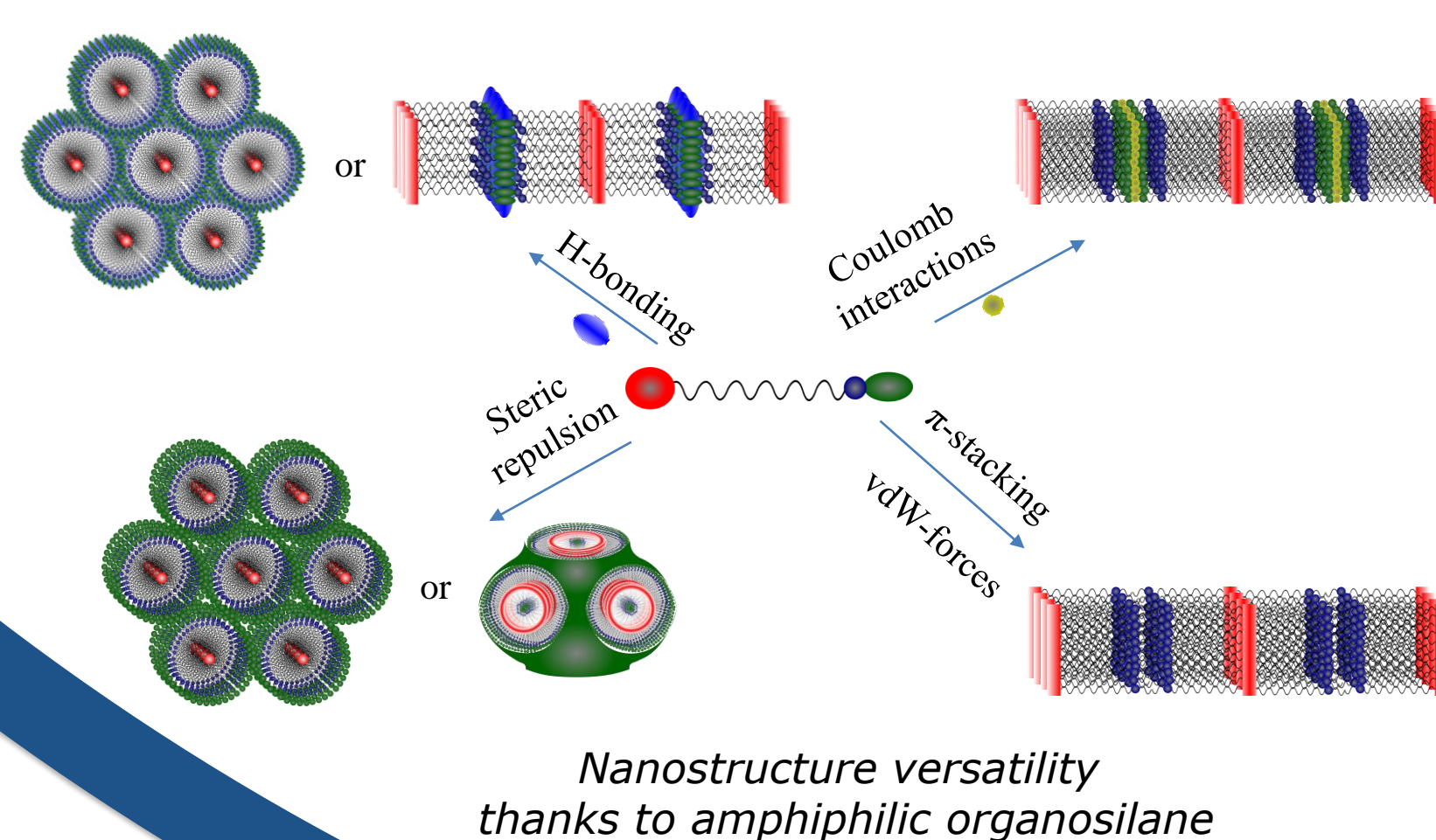
Formo-phenolic resins bearing chelating groups

- Leachates from primary and secondary resources
- Urban mine
- Contaminated effluents
- Sea water



Hybrid materials:

- Methodologies for hybrid materials synthesis (SiO₂, TiO₂, ZrO₂... based materials)
- Extraction and decontamination processes

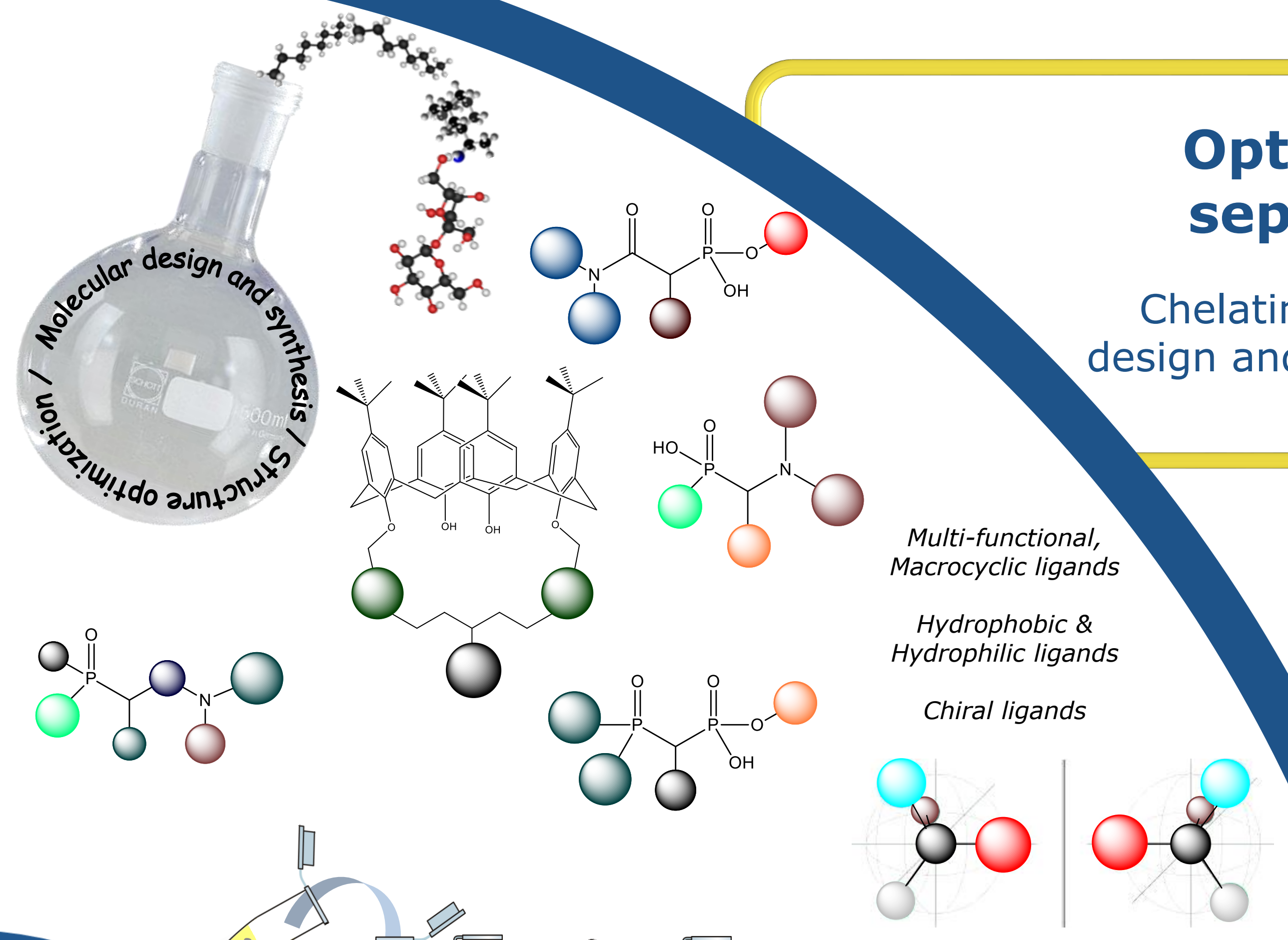


Extracting materials

Organic resins
Hybrid materials

Optimizing separation

Chelating systems design and synthesis

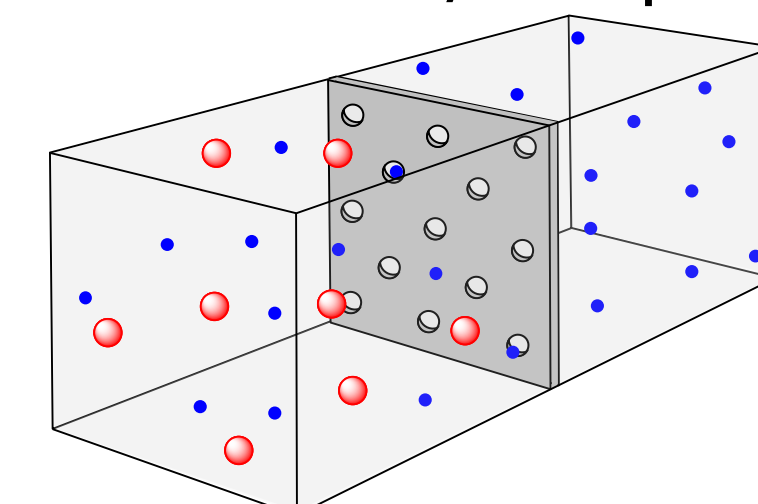


Liquid/Liquid extraction

- Nuclear fuel processing and reprocessing
- Extraction and recycling of strategic metals
- Decontamination of aqueous effluents

Filtration processes :

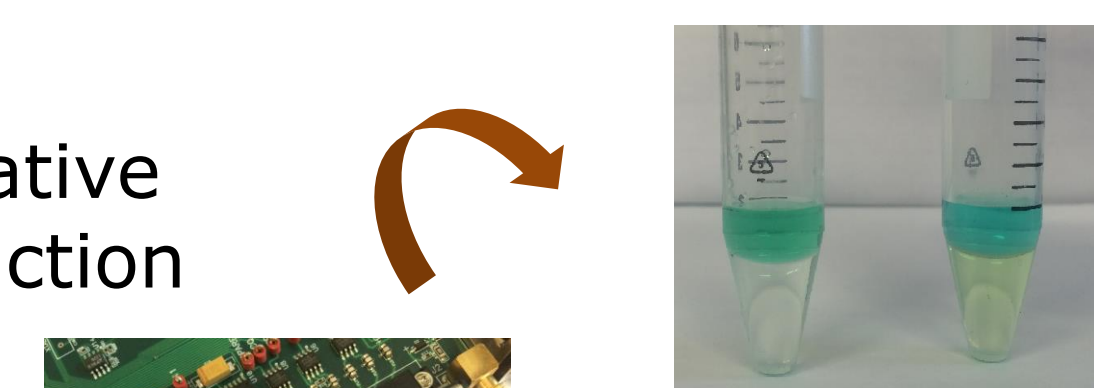
Membrane filtration
Membrane filtration/complexation



Ionic liquids :

RTIL's & TSIL's as alternative systems for solvent extraction

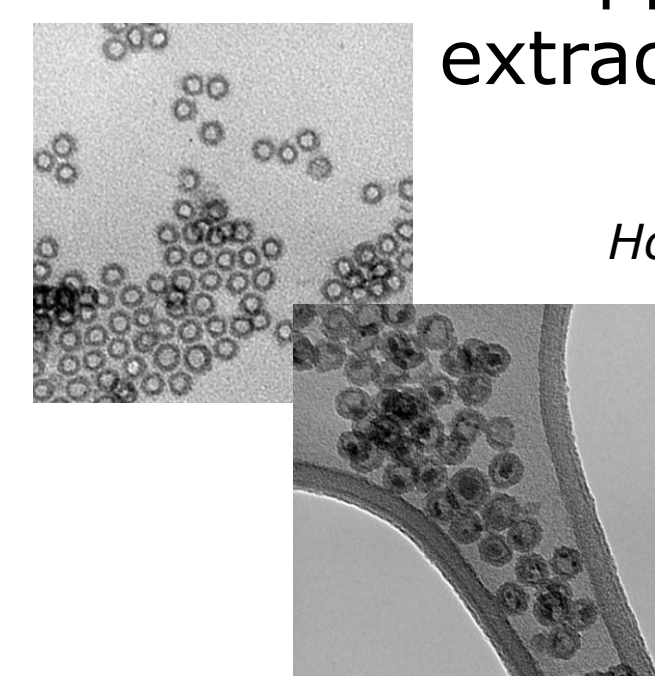
Extraction and recycling of strategic metal



Selective extraction and recovery of Ta / Pd / Au from e-waste (WEEE)

Porous liquids :

New approach for liquid-liquid extraction without solvent



Hollow silica nanoparticles that becomes liquids after ionic grafting

Alternative processes

Eco-friendly processes
Combined processes