Using soft interactions to design luminescent soft hybrid nanomaterials

Yann Molard*

Univ Rennes, Institut des Sciences Chimiques de Rennes, UMR 6226, 35000 Rennes (FR)

Octahedral metal clusters fill the gap between metal complexes and nanoparticles. They are finite groups of metal atoms linked by metal-metal bonds, with an exact composition and structure at the nanometer scale. With a phosphorescence internal quantum efficiency approaching 100%, they represent an attractive class of molecular building blocks to design lead-free, cadmium-free or rare earth-free hybrid nanomaterials dedicated to light energy conversion, optoelectronic, display, lighting or theragnostic applications. They are obtained as $A_nM_6X^i_8X^a_6$ ternary salt ceramic-like powders (A = alkali cation, M = Mo, Re, W, X^i: halogen inner ligand, X^a: halogen apical ligand) by high temperature solid state synthesis (750-1200°C) which has restricted their use as functional components in the past. Within this context, we have extensively explored the nanocluster ternary salt specificities to design clustomesogens *i.e.* transition metal cluster containing mesomorphic materials in which the cluster intrinsic properties are combined to the self-assembling abilities of liquid crystals.[1]

We will present the different strategies that were develop so far to design these materials focusing in particular on the soft methods allowing the cluster integration in its native ternary salt form.[2-3]

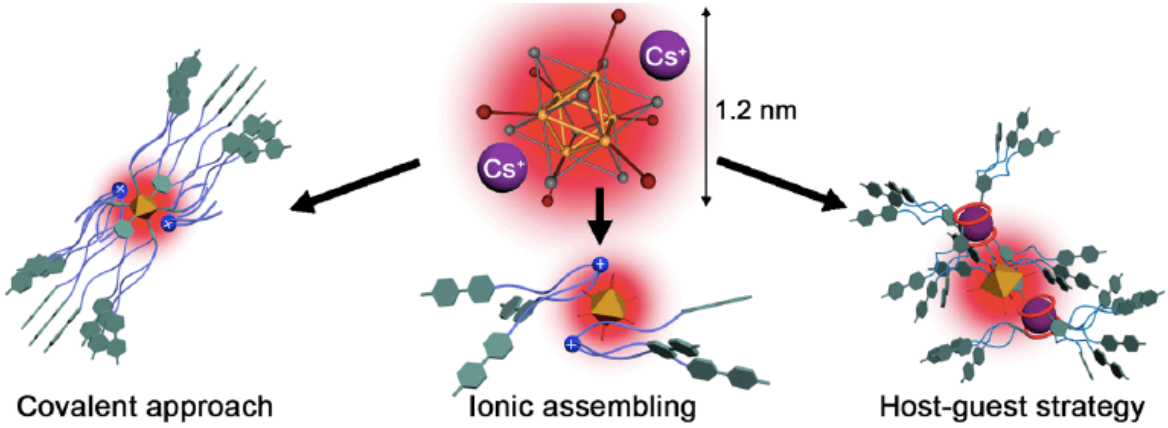

Figure 1. *Schematic description of three approach developed to design clustomesogens*

References

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**Corresponding author e-mail: yann.molard@univ-rennes1.fr*