F. A. Cotton introduced the term "metal atom cluster" in 1964 to describe a finite group of metal atoms that are held together by metal-metal bonds.\[1\] Among the metal atom clusters, octahedral clusters having \([\text{M}_6\text{L}^a\text{L}^i\text{L}^\text{a}]^n\) \((^a = \text{apical}, ^i = \text{inner})\) unit are easily obtained via solid state synthesis with 4d and 5d transition elements associated with halogen or chalcogen.\[2\] The intrinsic properties (optic, electronic and redox) of these octahedral cluster units depend on the nature of the metallic electrons available for metal-metal bonds. These clusters can be functionalized with organic ligands to introduce the intrinsic properties into hybrid materials. The strategies mainly adopted up to now for making hybrid materials of particular clustomesogens (Cluster containing mesomorphic hybrid material) are covalent or ionic self-assembling approach.\[3\] In the covalent approach, the organic promesogenic ligands are coordinated onto a cluster core whereas in the ionic self-assembling approach the metallic counter cation of the anionic metal cluster is replaced with organic promesogenic cations to provide the desired liquid crystalline (LC) properties.

In this presentation, we propose a new strategy based on supramolecular interactions to introduce transition metal cluster into LC materials. This new method, that could be envisioned as a "macrocyclic approach", allows to keep the luminescence properties of the native inorganic building block while providing a homogenous luminescence (Figure 1).

Figure 1: POM pictures obtained before and after integration of clusters in the LC matrix. a) Schlieren texture of ligand at \(T = 97^\circ\ C\); corresponding clustomesogen at \(T = 95^\circ\ C\) b) under white light, c) under irradiation@350-385 nm.

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References:

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