Stimuli-responsive water soluble Au(I) complexes

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Self-assembly of small molecules by the establishment of non-covalent interactions has received great attention in the past decade as a way to build supramolecular structures with a large number of specific functions and morphologies.1 As a result, supramolecular chemistry has matured from a conceptually marvelous scientific curiosity to a technologically relevant science encompassing a broad area of advanced materials. Within this field, gold(I) complexes represent an emerging area of investigation in the last years, as they show weak Au(I)···Au(I) interactions which can modulate and govern the resulting assemblies and properties in very different potential applications.2,3 An important goal, rarely explored, is the control over the aggregation motifs in order to obtain on/off aggregated/disaggregated systems. In this work we extend the development of these small molecules by adding a chelating unit able to trigger the assembly/disassembly process by external stimuli (e.g. cations and chelating molecules). At the same time, the increase in the number of aromatic rings, will allow a change in the balance between Au···Au and π···π interactions, which will impact on the stability of the aggregates. The complexation with cations will significantly change the electrostatic balance of the assemblies leading to dissociation. The disassembly can be reversed by the addition of molecules that compete for the metal cation, leading to reassemble of the nanostructures. Spectroscopical characterization by means of NMR, absorption, emission, optical and fluorescence microscopy, SAXS and theoretical calculations have been very useful to understand the systems.4

Figure 1. Schematic representation of the on/off aggregation/disaggregation motifs

References

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