Coordination polymers based on copper(I) thiolates: synthesis, characterization and applications

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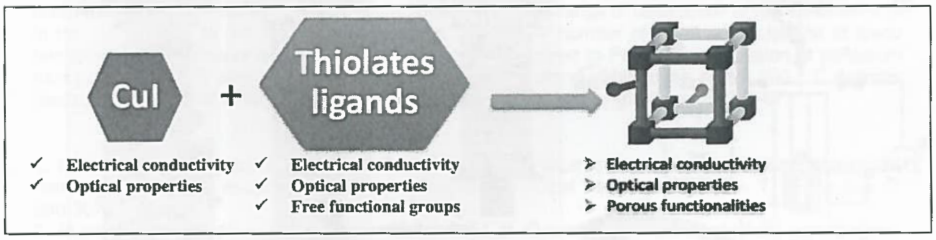
Coordination polymers (CPs) or metal–organic frameworks (MOFs), consisting of metal ions and bridging organic ligands, have attracted considerable interest as a potential source of functional materials that can display remarkable physical properties such as luminescence, magnetism, electrical conductivity, or a combination of more than one physical properties.[1] The properties of CPs/MOFs, basically, depend on the suitable selection of their main molecular components, i.e. the metal ion or cluster and the multidentate organic ligand, and on how they arrange to form the final solid state structure.

We are interested in the application of CPs/MOFs as chemical sensors which require signal transduction based on the dynamics of the analyte interacting with the CPs/MOF network. We honed from the design principles of previous research in the field of optical and/or conductive CPs/MOFs to select starting building blocks (Scheme 1) that can be employed to produce CPs/MOFs with remarkable optical and conductivity features. In that regard, copper(I) based CPs/MOFs have attracted great attention as potential candidates for optical, electronic, and optoelectronic applications. Copper(I), with a d^{10} electronic configuration, is well known for its diverse coordination geometries, which afforded CPs with unprecedented structural motifs and physico–chemical properties.[2] On the other hand, Copper(I) complexes with nitrogen–sulfur donor ligands have drawn much attention as suitable building units to construct new multifunctional materials with fascinating structures and properties where they adopt a wide range of coordination modes.[3] The selected units will offer extensive connectivity, flexibility, tunable porosity and functionalization of the inner surface of the network, with groups interacting with the analytes by means of coordination bonds, π-π interactions or hydrogen bonds.



Scheme.1. Building blocks selected to prepare CPs/MOFs with multifunctionalities.

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[3] Gallego, A.; Castillo, O.; Gómez-García, C. J.; Zamora, F.; Delgado, S., Inorg. Chem. (2012), 51 (1), 718-727.

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