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Porous and luminescent coordination complexes and networks assembled from a new ligand of nanometric lenght

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In our continued interest and search for new functional Coordination Networks (CNs) [1,2] we have designed and synthetized a new ligand containing the β-diketone fragment in the center and peripheral nitrile groups at nanometric distance (HL) (Fig. 1a). In the solid state HL adopt a helical arrangement and crystallize in the acentric space group Cc. The coordination ability of HL towards different metals is exploited through both the diketone and nitrile groups.
In particular, the reaction with Ag(I), which has great affinity to nitrile donors, allowed to isolate and characterize the two highly interpenetrated 2D CNs, Ag(HL)2 (1) and Ag(HL)2·3H2O (2). Structural analyses show the presence, in both compounds, of similar layers of sql topology (Fig. 1b) whose large rhombic windows enable the realization of high degree of interpenetration (Z) of 7 and 8 for 1 and 2, respectively (Fig. 1c). These are the highest value of Z reported so far for sql networks. The different Z is correlated to the conformational steric hindrance of the ligand, rather than to the size of the rhombic windows or to the nature of the counterions. To unveil the effect of interpenetration on the properties of the two compounds, we are investigating their photoluminescence and gas adsorption behaviour.
Reactivity of HL with different M(II) and M(III) metal ions is also under investigation and the results, comprising 3D networks and metal complexes, will be also presented.

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