ASSEMBLING MOLECULAR CRYSTALS

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The design of complex molecular systems in the crystalline phase may lead to the development of new solid-state materials and devices. The fabrication of such networks of crystals displaying task-specific properties is a step toward smart molecular materials.

We have developed a strategy based on the formation of molecular core-shell crystals, using series of isostructural compounds, build either from H bonds[1] or coordination bonds.[2]

A step further was reached by the welding, through 3D epitaxial growth, of *iso*-structural and almost *iso*-metric crystals into networks of crystals. Upon combining dicationic H-bond donor moities with anionic H-bond acceptor $[M^{II}L_2]^{4-}$ (M = Mn, Fe, Co, Ni, Cu or Zn) a series of *iso*-structural H-bonded robust coloured molecular crystals have been obtained.[3] These compounds, characterized by XRD methods, are described as H-bonded 3D networks of formula $\mathbf{1}_2$-ML_2. Taking advantage of their *iso*-structurality and difference in colour, different crystals have been welded in solution by epitaxial growth of a crystalline region between two seed crystals (figure 1).

More sophisticated monocrystals, presenting the control of the crystalline sequences along one axis, have been obtained by combining welding and also core-shell crystals.[4]

Crystal welding together with molecular core-shell crystals may be regarded as a first step toward the design of new hierarchically organized complex crystalline systems.

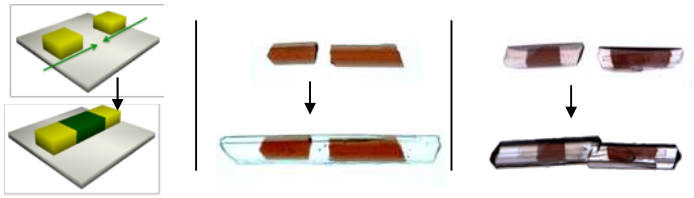

Figure 1: Schematic representation sand pictures of seed and welded crystals and welding from core-shell crystals.

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