Strange Crystals

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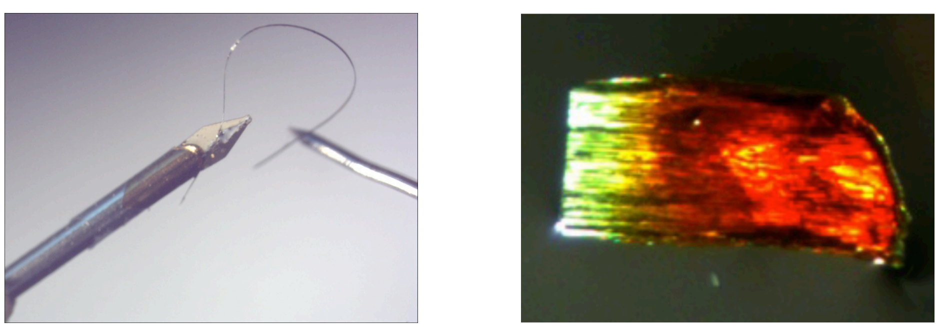
A crystal, by definition, is *a homogenous solid formed by a periodically repeating, three-dimensional pattern of atoms, ions, or molecules.*

Properties displayed by crystalline solids, such as diffraction of light, spin crossover behavior, 2nd order nonlinear optics, piezoelectricity and ferro- ferri- and antiferromagnetism, are profoundly influenced by the spatial arrangement of the molecules from which they arise and specifically because those molecules are arranged in periodically repeating patterns.

Our group has been exploring a range of different crystal formation phenomena. In the process we have uncovered "crystalline" systems that defy the classical definition of *what it means to be a crystal*.

For example, we have prepared a variety of multi-component molecular and framework crystals containing metal complexes arranged in intracrystal solid-state concentration gradients. Another example is a suite of highly flexible crystals capable of remarkable and reversible elastic contortion.[1]

In this presentation I will discuss the design, synthesis and characterisation of these crystals and the significance of their departure from the typical definition of crystalline materials.



Elastic flexibility in crystals of [Cu(acacBr)$_2$] (left) and a crystal comprising [Cu(bipy)$_3$](PF$_6$)$_2$ and [Ru(bipy)$_3$](PF$_6$)$_2$ in which the metal complexes are arranged with an intracrystal concentration gradient (right).

1. Worthy A, Grosjean A, Pfrunder MC, Xu Y, Yan C, Edwards G, Clegg JK, McMurtrie JC, *Nature Chem.*, **2018**, *10*, 65-69.