Research programme and achievements

We are a synthetic chemistry group at the Francis Crick Institute and King’s College London working to create artificial molecular machines capable of performing complex biological tasks, formed in February 2021.

Supramolecular chemistry is the study of non-covalent interactions between molecules. These non-covalent interactions are critical to biological processes like protein folding, DNA base pairing, and cellular signalling.

Our research looks at how we can combine principles from supramolecular chemistry with biological chemistry and nanotechnology to create new systems capable of carrying out
tasks like detecting and responding to chemical signals, or seeking out certain cells in the body.

We work with interlocked molecular structures like rotaxanes and catenanes, and molecular capsules with defined internal voids. By tapping into the chemical properties of these structures, we can create a host of useful molecular machines including targeted drug delivery vehicles and artificial cellular receptors.

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**Research outputs**


This paper showed for the first time that we could use flexible co-ordination to a labile metal to drive the assembly of complex architectures.


This paper showed for the first time that we could control which guest is bound inside a molecular capsule by functionalising the outside of that capsule, and so that post-assembly modifications could control the properties of a molecular capsule.


This paper reported an unexpected and counter-intuitive way to form mechanically interlocked molecules from extremely simple starting materials, providing a general approach to forming rotaxanes.