

## Research Project

### Supramolecular and nanoscale chemistry

#### Third-party funded project

**Project title** Supramolecular and nanoscale chemistry

**Principal Investigator(s)** [Constable, Edwin Charles](#) ;

**Co-Investigator(s)** [Housecroft, Catherine](#) ;

**Organisation / Research unit**

Departement Chemie / Anorganische Chemie (Constable)

**Department**

**Project start** 01.10.2008

**Probable end** 30.09.2010

**Status** Completed

This project is concerned with the use of supramolecular chemistry for the exquisite control of molecular components in (i) synthesis and (ii) molecule based devices. Dye-sensitized solar cells are an alternative technology to silicon photovoltaics. At present, state-of-the-art devices are based upon ruthenium complexes. Ruthenium supplies are limited and there is a need to find more renewable components. We are actively investigating the use of copper-based dyes in these systems. Molecular computing replaces silicon devices with molecules which may adopt two or more states. We use a combination of chemistry and light as the input and output of these devices. The design of molecular based machines relies upon the precise spatial arrangement of components. We are developing methods of engineering interactions between components to lead to precise three-dimensional structures, in particular at interfaces. Nanoparticles are ideal micro-reactors and carriers for reactants. We have developed a series of new methods for the production of decorated transition metal oxides. All of these studies are leading towards technological application of chemistry based devices.

**Keywords** Molecular computing, coordination chemistry, photovoltaic cells, copper, Nanoparticles, photochemistry, coordination networks, Polymers and networks, sugar, Supramolecular chemistry, reactivity, Solar cells

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