

Synthetic Crystallography

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The synthesis of new and designed crystal structures is part of a major strand of modern chemistry in which the focus has shifted from the analytical function of crystallography (the determination of crystal structures) to the synthetic. In synthetic crystallography, itself a branch of crystal engineering, a variety of means have been used in the attempt to plan and control the products and objectives of synthesis – the crystal structures.

Here strategies that might be adopted to achieve this synthetic goal are considered. In particular the utility of approaches based on supramolecular chemistry and molecular tectonics are examined. Progress is evaluated towards control of:

- a. *The composition of the final synthetic product - the crystal structure*
- b. *The supramolecular synthon formed.*
- c. *The periodic motif(s) formed.*
- d. *The entire crystal structure.*

Applications and properties of such "engineered" solids is of importance. One property of particular interest to chemists is reactivity – this at the heart of the history of crystal engineering and has received sustained attention from a relatively small number of groups, primarily in solid state organic and organometallic chemistry. The prospects for the application of supramolecular crystals in synthesis and the opportunity to exploit the unusual constraints they impose on molecular reactivity are considered.

Keywords: crystal engineering, supramolecular crystallography, inorganic solid-state chemistry