THE SELF-ORGANIZATION APPROACH

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Supramolecular chemistry is actively exploring systems undergoing *self-organization*, i.e. systems capable of spontaneously generating well-defined functional supramolecular architectures by self-assembly from their components, on the basis of the *molecular information* stored in the covalent framework of the components and read out at the supramolecular level through specific interactional algorithms, thus behaving as *programmed chemical systems*.

The implementation of molecular information controlled, "programmed" and functional systems allows the spontaneous but controlled generation of well-defined, functional molecular and supramolecular architectures of nanometric size through *self-organization by design* . It represents a means of performing programmed *engineering* and *processing* of *functional nanostructures*. It offers a very powerful alternative or complement to nanofabrication and to nanomanipulation for the development of nanoscience and nanotechnology.

Supramolecular entities as well as molecules containing reversible bonds are able to undergo a continuous change in constitution by reorganization and exchange of building blocks. This capability allows for *self-organisation with selection* and defines a *Constitutional Dynamic Chemistry* (CDC) on both the molecular and supramolecular levels. CDC introduces a paradigm shift with respect to constitutionally static chemistry. It takes advantage of dynamic constitutional diversity to enable variation and selection and thus *adaptation*.

These approaches have been implemented in the generation of functional organic and inorganic nanostructures for molecular and supramolecular electronics, spintronics and mechanics.

General references

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