

FROM SUPRAMOLECULAR TO ADAPTIVE CHEMISTRY
SOME CONTRIBUTIONS TO NANOSCIENCE AND NANOTECHNOLOGY

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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 designed *self-organization*. It represents a means of performing programmed *engineering* and *processing of functional nanostructures* and offers attractive perspectives to 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 defines a *Constitutional Dynamic Chemistry* (CDC) on both the molecular and supramolecular levels. It takes advantage of dynamic constitutional diversity to enable variation and selection and thus allow for adaptation leading to the emergence of an *adaptive chemistry*.

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

General references

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