

Supramolecular Chemistry: Contributions to Biotechnology and Nanotechnology

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Supramolecular chemistry is concerned with the structures and functions of the entities formed by the binding of substrate species to a molecular receptor through non-covalent interactions. Numerous studies have been directed toward the design of artificial receptors capable of selectively binding specific substrates, thus achieving molecular recognition processes.

A number of investigations have been performed at the interface between supramolecular chemistry and biology. They concern developments in areas such as : optical sensing of biomolecular recognition, modified liposomes bearing recognition groups (recosomes), dynamic combinatorial chemistry, gene transfer methodology, self-assembly processes. Several of them will be discussed, in particular with respect to their role in biotechnology.

The implementation of molecular recognition and information offers means for controlling the evolution and the architecture of supramolecular entities as they build up from their components through self-organization.

The spontaneous but controlled generation of well-defined, functional molecular and supramolecular architectures of nanometric size through self-organization represents a means of performing programmed *engineering* and *processing* of *functional nanostructures*. It offers a very powerful alternative to nanofabrication and to nanomanipulation and provides an original approach to nanoscience and nanotechnology.

General references

- Lehn, J.-M., Supramolecular Chemistry: Concepts and Perspectives, VCH Weinheim, 1995.
- Lehn, J.-M., "Supramolecular Chemistry/Science Some Conjectures and Perspectives", in Supramolecular Chemistry: Where It Is and Where It Is Going (R. Ungaro, E. Dalcanale, eds.), Kluwer, Dordrecht, 1999, pp. 287-304.
- Lehn, J.-M., "Toward complex matter : Supramolecular chemistry and selforganization", Proc. Natl. Acad. Sci. USA, 2002, 99, 4763.
- Lehn, J.-M., "Toward self-organization and complex matter", Science, 2002, 295, 2400.

