

Perspectives in Chemistry: Towards Complex Matter

Jean-Marie LEHN
ISIS, Université de Strasbourg

Molecular chemistry has developed a wide range of very powerful procedures for building ever more complicated molecules from atoms linked by covalent bonds.

Supramolecular chemistry aims at generating highly complex chemical systems from molecular components held together by non-covalent intermolecular forces, on the basis of the *molecular information* stored in the covalent framework of the components. A step beyond consists in the design of systems undergoing *self-organization*, i.e. systems capable of spontaneously generating well-defined functional architectures by self-assembly from their components.

Supramolecular chemistry is intrinsically a *dynamic chemistry* due to the lability of the interactions connecting the molecular components of a supramolecular entity. The same holds for molecular chemistry when the molecular entity contains covalent bonds that may form and break reversibly. These features allow for a continuous change in constitution by reorganization and exchange of building blocks and define a *Constitutional Dynamic Chemistry* on both levels. They implement variation and selection leading to the emergence of an *adaptive chemistry* on the way towards complex matter.