



Seminario

Università degli Studi di Padova
Dipartimento di Scienze Chimiche

Ciclo di Seminari 'Frontiers in Chemistry'

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Supramolecular Chemistry and Beyond

Aula A - Mercoledì 5 Luglio 2023, ore 11.00

Supramolecular chemistry aims at generating complex chemical systems from molecular components held together by non-covalent intermolecular forces. It extends towards the design of systems undergoing *self-organization*, i.e. systems capable of generating well-defined functional architectures by self-assembly from their components.

Supramolecular chemistry is intrinsically a *dynamic chemistry* in view of the lability of the interactions connecting the molecular components of a supramolecular species and the resulting ability to exchange components. Dynamic covalent chemistry is based on molecular entities containing 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* (CDC) covering both the molecular and supramolecular levels.

CDC introduces a paradigm shift with respect to constitutionally static chemistry. It takes advantage of dynamic diversity to allow variation and selection and operates on dynamic constitutional diversity in response to perturbations by physical stimuli or to chemical effectors to achieve *adaptation*.

CDC generates *constitutional dynamic networks* that define the relationships between the dynamically interconverting constituents. Of special interest is the case of systems driven by self-organization towards an *increase in order*.

The implementation of these concepts points to the emergence of *adaptive* and *evolutionary chemistry*, towards *systems of higher complexity*.

For selected references, see:

Lehn, J.-M., *Supramolecular Chemistry: Concepts and Perspectives*, VCH Weinheim, 1995.

Lehn, J.-M., Dynamic combinatorial chemistry and virtual combinatorial libraries, *Chem. Eur. J.*, 1999, 5, 2455.

Lehn, J.-M., Toward complex matter: Supramolecular chemistry and self-organization, *Proc. Natl. Acad. Sci. USA*, 2002, 99, 4763.

Lehn, J.-M., From supramolecular chemistry towards constitutional dynamic chemistry and adaptive chemistry, *Chem. Soc. Rev.*, 2007, 36, 151.

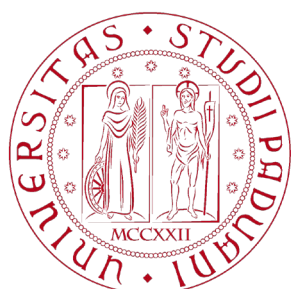
Lehn, J.-M., Perspectives in Chemistry – Steps towards Complex Matter, *Angew. Chem. Int. Ed.*, 2013, 52, 2836-2850.

Lehn, J.-M., Perspectives in Chemistry – Aspects of Adaptive Chemistry and Materials, *Angew. Chem. Int. Ed.*, 2015, 54, 3276-3289.

Gu, R., Lehn, J.-M., Constitutional dynamic selection at low Reynolds number in a triple dynamic system: Covalent dynamic adaptation drive by double supramolecular self-assembly", *J. Am. Chem. Soc.* 2021, 35, 14136-14146. .

La presenza della S. V. sarà molto gradita.

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