NTA2022

2nd International Conference on
Nanotechnology: Theory and Applications,
Cairo, 19 – 21 Dec., 2022

Ref. 001

Invited Nobel Prize Laureate:

Towards Adaptive Nanoscience and Nanotechnology

Jean-Marie LEHN

Director, Laboratory of Supramolecular Chemistry, University of Strasbourg, France, lehn@unistra.fr

Prof Jean-Marie Lehn was born in Rosheim, France in 1939. In 1970 he became Professor of Chemistry at the Université Louis Pasteur in Strasbourg and from 1979 to 2010 he was Professor at the Collège de France in Paris. He is presently Professor at the University of Strasbourg Institute for Advanced Study (USIAS). He shared the Nobel Prize in Chemistry in 1987 for his studies on the chemical basis of "molecular recognition" (i.e. the way in which a receptor molecule recognizes and selectively binds a substrate), which also plays a fundamental role in biological processes.

His work led him to the definition of a new field of chemistry, which he has proposed calling "supramolecular chemistry" as it deals with the complex entities formed by the association of two or more chemical species held together by non-covalent intermolecular forces, whereas molecular chemistry concerns entities linked by covalent bonds. Subsequently, the area developed into the chemistry of "self-organization" processes and more recently towards "adaptive chemistry", dynamic networks and complex systems. Author of more than 1000 scientific publications, Lehn is a member of many academies and institutions. He has received numerous international honors and awards.

Lehn Home Page: https://isis.unistra.fr/laboratory-of-supramolecular-chemistry-jean-marie-lehn/

ABSTRACT

Supramolecular chemistry is actively exploring systems undergoing *self-organization*, i.e. systems capable of spontaneously generating well-defined functional supramolecular architectures by *molecular information* controlled self-assembly from their components. Such programmed *engineering* and *processing* of *functional nanostructures* 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 their building blocks. This capability defines a *Constitutional Dynamic Chemistry* (CDC) on both the molecular and supramolecular levels. CDC 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 dynamic features introduce a paradigm shift in soft matter chemistry towards *Dynamic Nanoscience and Nanotechnology*.

General References

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

[1] Lehn, J.-M., *Toward self-organization and complex matter*, Science, **2002**, 295, 2400.

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

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

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