Perspectives in Chemistry:
From Supramolecular Chemistry towards Adaptive Chemistry

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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. 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* (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 either internal or external factors to achieve *adaptation*.

CDC generates networks of dynamically interconverting constituents, *constitutional dynamic networks*, presenting *agonistic* and *antagonistic* relationships between their constituents that may respond to perturbations by physical stimuli or to chemical effectors.

In materials science, it leads in particular to the generation of dynamic polymers, *dynamers,* and biopolymers.

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

References

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