

# Self-Assembled Organic Nanotubes: A Novel Platform for Drug Design and Discovery

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## Abstract

*Self-assembly and self-organization processes are the thread that connects the reductionism of chemical reactions to the complexity and emergence of a living dynamic system. Artificial self-assembly derives its principles from nature and its processes, and uses this understanding to design nanoscale devices with predefined function. However, complex forms of organized matter cannot be synthesized bond-by-bond. Rather, a new type of synthesis based on non-covalent forces is necessary to generate functional entities from the bottom up. This growing field of the chemical sciences challenges much of the basic premises of conventional Woodwardian chemistry: The conceptualization of an organized state of matter requires in-depth understanding not only of chemical reactivity but also of non-covalent forces necessary to translate chemical information into functional superstructures.*

*The rosette nanotubes are organic materials obtained through the hierarchical self-assembly and self-organization of rationally designed, biologically inspired synthetic molecular modules [1-4]. These materials have demonstrated that complex yet well-defined nanostructures maintained by H-bonds, dipolar and London dispersion forces could be assembled not only in the solid state or in organic media but also in water under physiological conditions. Thus, the synergies between non-covalent forces that govern a supramolecular synthetic scheme can be rationally approached and integrated. This work has also expanded the repertoire of design principles not only for the generation of well-defined static assemblies but ultimately also for*

*the implementation of nanoscale systems displaying a dynamic relationship with their environment, the ability to adapt, evolve and replicate [3]. This talk will focus on the synergies between electrostatics and hydrophobic interactions as a driving force for self-assembly of nanotubular materials with predefined dimensions and properties and their potential as a novel platform for drug design and discovery [4].*

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