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Hybrid Inorganic Nucleic Acid Structures for Nanotechnology Applications

Nucleic acids hold great potential as building blocks for smart materials and devices. This potential is related to their ability to store information in the sequence of nucleobases, a potential demonstrated by the essential role played by DNA and RNA in living organisms.

The use of synthetic nucleic acids, which are not recognized by enzymes that can limit the lifetime of natural nucleic acids in biological environment, can expand the type of biological and biomedical applications of nucleic acid-based materials. This presentation will illustrate how one can use organic synthesis and coordination chemistry to assemble DNA and pseudopeptide nucleics acid (PNA) into supramolecular structures of predefined geometry and chirality.

The physical properties of these structures depend on the interplay between nucleobase hybridization and metal-ligand coordination, as shown by a combination of spectroscopic, thermodynamic and structural methods. The implications of these findings for the use of hybrid inorganic-nucleic acid structures for applications in nano- or bio-technology will be discussed.