

Biomolecular Nanostructures for Sensing, Machinery and Nanocircuitry

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The synthesis of biomolecule/nanoparticle (or carbon nanotubes) hybrid systems or the self-assembly of biomolecular nano-structures provide materials of new emerging functionalities and properties. The development in the area of nanobiotechnology will be discussed by addressing the following topics: (i) Electrical contacting of redox enzymes with electrodes by means of metallic nanoparticles (NPs) or carbon nanotubes.¹ (ii) The use of semiconductor quantum dots (QDs) for molecular and biomolecular sensing.² (iii) The use of the information encoded in nucleic acid structures to self-assemble into functional nanostructures. This will be exemplified with self-organized DNA nanostructures acting as machines (tweezers, walkers, steppers)³, the self-assembly of nucleic acids into nanotubes, the programmed positioning of proteins on DNA nanostructures for the activation of enzyme cascades,⁴ and the use of biomolecular templates for growing nanocircuitry. (iv) The tailoring of DNA replication machines for amplified sensing and potential PCR alternatives.⁵

References:

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