

# DNA Nanotechnology Based Emerging Technologies for Biological and Biomedical Applications

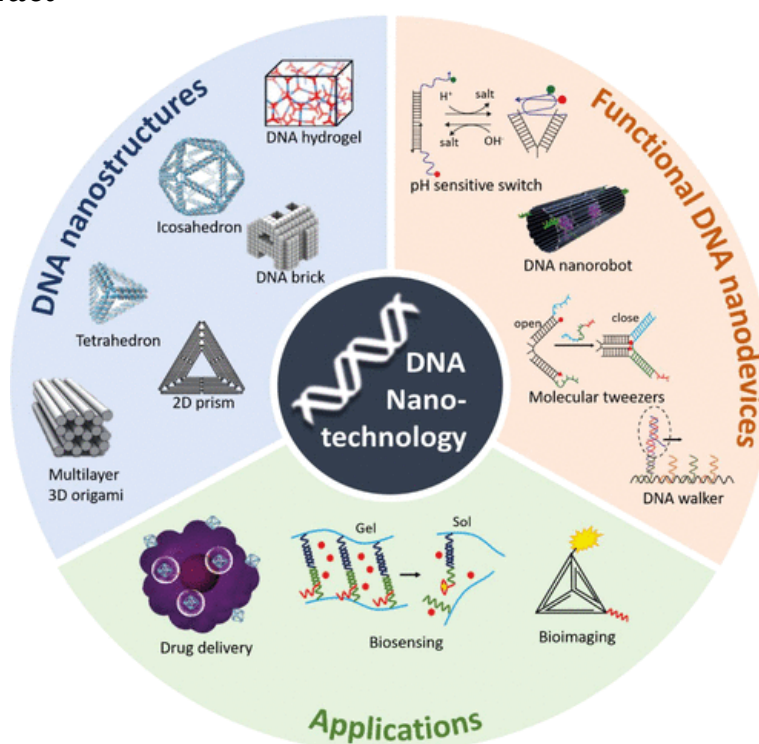
**Dhiraj Bhatia**

Biological Engineering Discipline, Indian Institute of Technology Gandhinagar, IIT Gandhinagar, Near Palaj Village, Gandhinagar 382355, Gujarat, India

Corresponding author: E-mail: dhiraj.bhatia@iitgn.ac.in

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## Graphical Abstract



## Abstract

My laboratory ask how nanometer-sized biomolecules transmit and integrate information across much larger length scales of the orders of cells and tissues. We seek to explore how collections of macromolecules work together to establish a common functional system like cellular pathways, organelles, living cells and further into tissues, organs and entire organisms. Different biomolecules establish long-range orders in living systems by self-assembling into much larger structures, such as molecular complexes, membranes, and cytoskeletal organelles, intra- and inter-cellular contacts, and long range contacts. The main theme of our lab will be understand the assembly principles of biological systems and the roles they play in living cells, tissues and full organisms...and further developing technologies to modulate the same. To address these problems, we adapt multidisciplinary, bottom-up approach using DNA nanotechnology. DNA has immense potential to arrange the matter at nanoscale with extreme robustness and spatial specificity. The compatibility of DNA to interface

with other biomolecules like proteins, carbohydrates, lipids, small molecules make DNA a natural choice of material for bottom-up self-assembly. Thus, we will merge the complex programmability of DNA nanotechnology with the structural and functional diversity of other biomolecules. Our interdisciplinary research, along with national and international collaborations with experts, will leverage expertise from chemistry, nanotechnology, biophysics, biology, engineering, and medicine. The overarching goal of the my team would be to translate laboratory findings into the development of new therapeutic strategies.

**Keywords:** Structural DNA nanotechnology, 3D cages, monofunctionalized quantum dots, single particle tracking.

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## Biography of Presenting Author



**Dhiraj Bhatia** obtained his PhD from NCBS-TIFR in Bangalore, India in DNA Nanotechnology. Post PhD he went to Curie Institute in Paris to join the team of Ludger Johannes initially as Curie fellow and later as HFSP long-term fellow where he learnt the cellular and biological applications of DNA nanodevices. In 2018, he moved to India to start his own laboratory at Indian Institute of Technology Gandhinagar where he is an Assistant Professor and Ramanujan fellow. His lab focusses on translational aspects of DNA nanotechnology to develop tools to program biological systems and having biomedical applications.

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