# Building Dream Functional Molecules with DNA Bases


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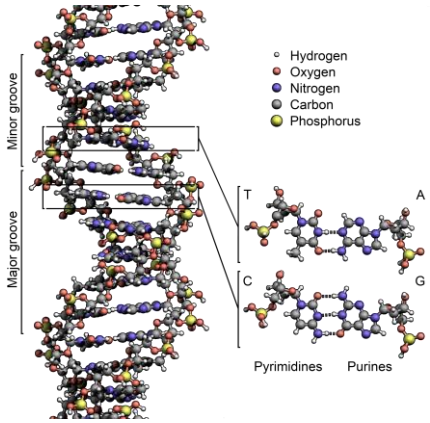
Making highly functional molecules for designer applications is the dream of most chemists and biologists. While extremely challenging, chemists have developed various synthetic methods to reach their goals of making molecules. These synthetic methods are highly effective in making small molecules. However, creating large biomolecules with advanced functions still remains a daunting task. On the other side, DNA bases, created from chemical synthesis, can be readily used as elegant and versatile building blocks to construct a variety of functional macromolecules in one's dream. In this talk, we will discuss the construction of three types of molecules using DNA bases: molecular beacons for genomics in exploring gene functions; molecular aptamers for proteomics in discovering disease biomarkers; molecular motors for future energy in light-harvesting. While different in functions, these large molecules can all be synthesized easily with the same four DNA bases made by current synthetic methods. The way each base is engineered to the functional molecule uses the same chemistry and is even done automatically by a DNA synthesizer, but the sequence of the bases in the made molecule dictates the molecular functions. From this unique angle, our work takes advantages of the easily available and precisely programmable DNA bases for molecular engineering of a great variety of functional molecules and will demonstrate the great potential of using DNA bases in making designer molecules for many challenging applications confronting chemists today and tomorrow. With the further development of artificial DNA bases using smart organic synthesis and creation of DNA nanostructures using elegant molecular assembly approaches, macromolecules with great diversity, additional versatility and advanced functions are expected.

## Weihong Tan

Weihong Tan received his Ph.D. in Physical Chemistry from the University of Michigan, Ann Arbor in 1993. In 1996, he joined the University of Florida as an Assistant Professor of Chemistry, and was promoted to Associate Professor (2001) and Professor (2003). He was named a University of Florida Research Foundation Professor (2004), V. T and Louis Jackson Chair Professor (2008), and University of Florida Distinguished Professor (2012). He is currently the Director of the State Key Laboratory of Chemo/Biosensing and Chemometrics, Hunan University. Tan's group has developed research programs in chemical biology, bionanotechnology, bioanalysis and biomedical engineering. Currently, the Tan group is working on producing a variety of nucleic acid probes for biomedical studies and for single molecule nanomotors, in developing new nanomaterials and bionanotechnology for bioanalysis, molecular imaging and drug delivery, and in elucidating the molecular foundation of diseases such as cancer using a chemical biology approach. His work has been recognized by many awards, including the Pittcon Achievement Award and the American Chemical Society Florida Award. Tan has published extensively in the field of chemical biology, molecular engineering, bioanalytical chemistry and bionanotechnology with more than 345 papers, with an H-index of 72 and more than 16,500 citations.

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