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Conjugations of inorganic nanomaterials with functional nucleic acids for enhanced molecular recognition

Ronghua Yang

State Key Laboratory of Chemo/Biosensing and Chemometrics, Hunan University

Nucleic acids, whether designed or selected in vitro, play important roles in biosensing, medical diagnostics, and therapy. Specifically, the conjugation of functional nucleic acid based probe molecules and nanomaterials has resulted in an unprecedented improvement in the field of molecular recognition. With their unique physical and chemical properties, nanomaterials facilitate the sensing process and amplify the signal of recognition events. Thus, the coupling of nucleic acids with various nanomaterials opens up a promising future for molecular recognition. We report herein the recent study of our group on how to combine DNA molecular design and nanoparticle materials as new approaches for to achieving efficient molecular recognition[1],[2], which includes: 1) non-covalent assembly of single-walled carbon nanotubes and fluorescent single-stranded DNA for fluorescent assays of DNA hybridization,[3],[4] thrombin,[5],[6] and time-resolved luminescent detection of lysozyme,[7] 2) combination of gold nanoparticle-quenched fluorescent oligonucleotides with metal-DNA ligation or DNA ligase reaction for fluorescent assayings of metal ion and SNP, [8],[9] and 3) nucleic acid conjugated quantum dot to separate molecular recognition element and signal reporter for nucleic acid probe.[10]

Biography

Yang has completed his Ph.D at the age of 28 years from Hunan University and postdoctoral studies from College of Chemistry and Molecular Engineering of Peking University. He won “The National Science Fund for Distinguished Young Scholars of NSFC Award” in 2005 and “The Second Prize of National Nature Science Award of China” in 2011. He has published more than 70 papers in reputed journals and serving as two editorial board members of repute.

0006164518@pku.edu.cn