

DNA-Based Material Systems for Applications in Sensing and Medicine

김은정[†]
인천대학교
(e.kim@inu.ac.kr[†])

DNA-based materials are attracting so much attention because they allow the design and assembly of well-defined structures by DNA hybridization. Of great importance is the functionalization of those DNA materials with non-nucleic acid components such as proteins and nanoparticles, thereby broadening the bioavailability of materials with limited properties entirely composed of nucleic acids. Here, we have shown a few examples of using nucleic acids as generic materials to construct DNA-inorganic hybrid composites. Firstly, we co-employed surface-functionalized nanoparticles with DNA strands and enzyme-triggered or enzyme-free signal amplification approaches to amplify sensor responses, achieving ultrasensitive and selective detection of nucleic acids. Based on rolling circle techniques, we have also developed robust and straightforward strategies that enable facile conjugation or attachment with various biomolecules and nanomaterials. Therefore, the proposed concepts represent a promising opportunity to create new functional DNA materials that can substantially advance numerous applications of nucleic acids in biomedical research.