

Fluorescence Resonance Energy Transfer based Detection of Mutation in Epidermal Growth Factor Receptor

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Targeting the EGFR(Epidermal Growth Factor Receptor) of the non-small cell lung cancer (NSCLC) patients provides one of most promising strategy for NSCLC therapy since its tyrosine kinase inhibitor (TKI) such as gefitinib has emerged as an effective curing agent for some patients. We designed the sensing system for mutation in the Exon 19 and 21 of EGFR using water-soluble CdSe QDs and sphere/hollow Au nanoparticles. To fabricate this sensor, we synthesized the functionalized CdSe QDs using EDC-NHS conjugation process and the sphere/hollow Au nanoparticles. We tuned the absorption wavelength of hollow Au nanoparticles by controlling the amount of HAuCl₄ added. For simultaneous detection of mutation in Exon 19 and 21, we functionalized CdSe QDs and Au nanoparticles using two different types of probe DNAs. The FRET phenomenon between CdSe QDs and sphere/hollow Au nanoparticles was shown to occur for the Exon 19 or 21 with mutation. Photoluminescence and UV-vis spectroscopy were used to monitor the spectral changes in solution. Our results have a great significance in biological and medical research including tailored medicine treatment and clinical diagnosis and therapy.