

Homogeneous Biosensor Based on Luminescence Resonance Energy Transfer Using the Upconversion Nanoparticles

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We report biosensors for homogeneous detection based on luminescence resonance energy transfer (LRET) using the upconversion nanoparticles. The LRET platform for immunosensor has been designed by using UCNPs as the donor and target as the acceptor. When target was added, the LRET occurred between a donor and acceptor under the laser irradiation with a wavelength of NIR. Because of the specific recognition between the antibody functionalized UCNPs and target. In the presence of target, the distance between UCNPs (donor) and target molecules (acceptor) get closer to transfer energy. The LRET platform for an aptasensor has been designed for the target detection by using UCNPs as the donor and target-specific aptamer. In the presence of target molecules, aptamer sequence was folded due to the formation of the G-quadruplex, which induced the quencher dye close to the UCNPs. Consequently, the luminescence quenching of UCNPs is induced by LRET of biosensing platforms. In our optimized system, results showed the LRET-based biosensors enabled specific target detection, and target molecules can be detected sensitively in a homogeneous manner.