論 文 の 内 容 の 要 旨

論文題目
Development of Turn-on Biomolecule Sensors Utilizing Exciton-controlled Hybridization-sensitive Fluorescent Oligonucleotide Probes
(励起子制御された二重鎖形成感受性蛍光オリゴヌクレオチドプローブを用いたターンオン型生体分子センサーの開発)

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This doctor thesis presented the development of turn-on biosensors by smartly controlling the excitonic states of dyes. Hybridization-based fluorescent control by exciton interaction was introduced to aptamer-based biosensor design replacing the distance-based fluorescent control via energy transfer. A turn-off neomycin B aptamer sensor was designed based on the inhibition of dye intercalation induced by neomycin B binding in Chapter 2. This competition-caused fluorescent turn-on was further used for bacterial counting. A turn-on ATP RNA aptamer was created by transducing ATP-binding into duplex recognition by TO homodimer in Chapter 3. The aptamer-based biosensor design in Chapter 2 and Chapter 3 was conversing from a three-dimensional consideration into a two-dimensional attention. The exciton controlling notion was also extended into the usage of two-photon-excitable fluorophores as the two-photon-excitable ECHO probes in Chapter 4.