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Abstract

Split Deoxyribozyme Sensors for Pathogen Detection †

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Deoxyribozymes (Dz), catalytic DNA molecules, are promising tools to design nucleic acid sensors. In comparison with conventional hybridization probes and assays relying on protein enzymes, Dz-based sensors offer an advantage in signal amplification without compromising the sensor stability. Here, we present split Dz (sDz) sensors, which consist of two Dz subunits, each containing a half of the Dz catalytic core, as well as target-complementary fragments. In the presence of a specific nucleic acid target, the catalytically active construct is formed by binding the two subunits to the abutting target fragments, and a signal (e.g., fluorescence or color change) is generated due to the Dz catalytic activity. The signal depends on the target concentration and is therefore able to monitor for target detection and quantification. This approach is also applicable for the design of integrated sensors that have an additional computing element to convert the target-recognition event into a signal based on the embedded logic function. We demonstrate the advantages of the sDz approach by applying the sensors for the detection of bacterial and viral pathogens including *Mycobacterium tuberculosis* and ZIKA virus.

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