

Target-responsive switching of
DNA polymerase activity

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A novel concept that target molecules can induce switching of DNA polymerase activity is devised. The method relies on the finding that a DNA aptamer inhibiting DNA polymerase can undergo conformational change upon interaction with a corresponding target molecule, which leads to the recovery of DNA polymerase. The activated DNA polymerase then promotes the multiple primer extension reactions in a separate TaqMan probe-based signal transduction module, consequently producing significantly enhanced fluorescence signal which can be used to confirm the presence of the target molecules. This design principle was very successfully applied to identify the presence of target DNA, proteins, and even metal ions with high levels of sensitivity and selectivity. We further expanded this innovative concept to develop novel assays for several nucleic acid-related enzymes.