Electronic Supporting Information

Controlling the function of DNA nanostructures with specific trigger sequences

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Experimental Section

Materials. We obtained nuclease-free water from Qiagen (Hilden, Germany) and Tris base, $MgCl_2$ and HCl from Sigma-Aldrich (St. Louis, MO, USA). Non-modified and modified oligonucleotides were synthesized by Integrated DNA Technologies (Coralville, IA, USA) and Biosearch Technologies (Novato, CA, USA), respectively. Nucleic acid sequences are as follows: (BHQ = Black Hole Quencher; r = ribonucleotide): **(1)** SDZ molecule, 5'-AGGGACCAGGCTAGCTACAACGATTTACCTTTTTTTAGGTAAAATCAGGGGGTCC CTTTTTTTTTTTTTCCCTGAT-3'; **(2)** substrate: 5'-CAL-FluorRed610-AGGTAAArGrUGGTCCC-BHQ2-3'; **(3)** 19-nt perfect match (PM) trigger sequence: 5'-GGGACCCCCTGATTTTACC-3'; **(4)** 19-nt single mismatch (MM) trigger sequence: 5'-GGGACCCCCTCATTTTACC-3'. MM variant oligonucleotides used to characterize the effects of different nucleotide changes or mismatch position shifts are given in Table 1.

Fluorescence measurements of SDZ activity. All assays were performed in a total volume of 55 µL hybridization buffer, consisting of 1 mM Tris base and 0.5 mM $MgCl_2$ in nuclease-free water, adjusted to pH 7.5 with HCl. 15 nM SDZ **(1)** was mixed with PM **(3)** or MM **(4)** trigger sequences at varying concentrations (0.1 – 100 nM) in hybridization buffer, heated to 95 °C for 5 minutes, cooled to room temperature for 1 hour and incubated at room temperature for 2 hours. Then, substrate **(2)** was added to a final concentration of 400 nM and the mixture was incubated at room temperature for 3 hours. For time-course experiments, this mixture was incubated for a range of durations. Fluorescence intensities were measured in Microfluor 2 black microplates (Thermo Fisher Scientific, Waltham, MA, USA) with the Tecan Infinite M1000 microplate reader (Männedorf, Switzerland) using excitation and emission wavelengths of 590 nm and 600 nm, respectively.

Kinetic data

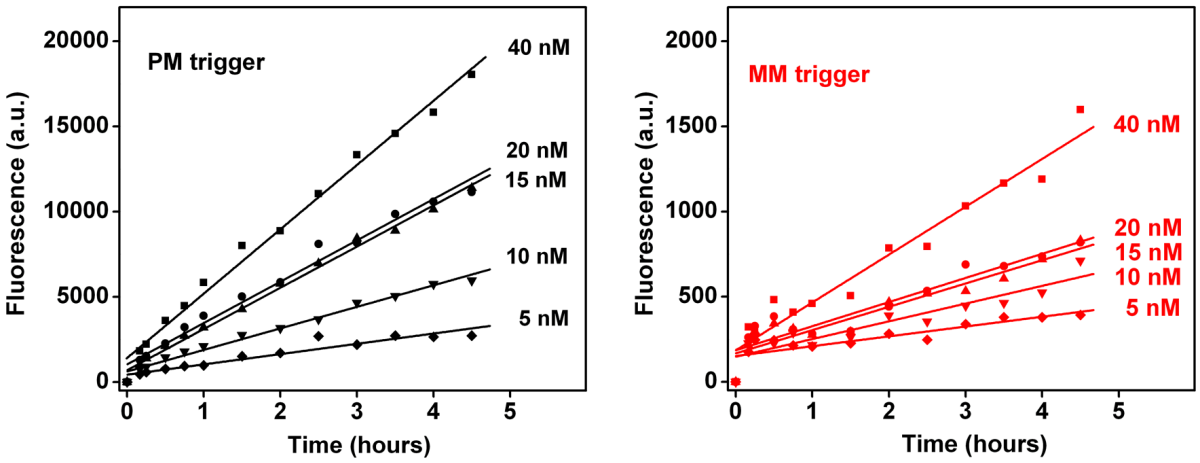

Figure S1. Characterization of the SDZ kinetics. We measured reaction kinetics in a series of time-course experiments in which we systematically varied the concentration of the PM (left) and MM (right) trigger sequence, with fixed concentrations of SDZ (15 nM) and substrate (400 nM).