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Kinetic Modeling of Designed Signaling DNA Aptamers ISSEI NAKAMURA, RAZVAN NUTIU, JASMINE YU, YINGFU LI, AN-CHANG SHI, McMaster University — Aptamers are recently developed molecular biosensors made of single functionalized DNA molecules. They can bind a protein target specifically or a complementary DNA sequence. The binding kinetics can be studied based on the principle of fluorescence quenching, which in turn provides an understanding of the binding mechanism and the conformational structure of DNA during the binding reaction. Despite many experimental studies, an understanding of the binding reaction is still lacking. In our study, we constructed kinetic models for the aptamer binding reaction, and showed that the theoretical models can be studied to describe experimental observations. Determined parameters for the rate constant for the reaction provided us with an understanding of the binding mechanism of aptamers. We will discuss the numerical solutions to them in comparison with the experiment and show how the binding reaction of aptamers occurs as time proceeds.

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