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PROGRAMMABLE ANTIBODY-BASED MOLECULAR SWITCHES FOR TARGET ANALYTE DETECTION

Researchers at Stanford and the Chan Zuckerberg Biohub have developed antibody-based molecular switches for target analyte detection.

The development of technologies that can monitor circulating biomolecules have transformed modern medicine. Molecular switches, which change their conformation upon target analyte binding, can be coupled to other molecular machinery to trigger a wide range of downstream readouts. There is a growing interest in engineering modular, sensitive, and reversible molecular switches for biotechnology applications.

Stage of Research

The inventors have developed methods for the design and generation of reversible and programmable antibody-based molecular switches. Antibody switch constructs change conformation upon target analyte binding, displacing a blocking analyte to produce a detectable readout. The workflow for synthesizing antibody switch constructs is designed to be modular and relies on conjugating the blocking analyte of choice to a DNA scaffold, then assembling the remaining construct and reporters through attachment of the DNA linker to the Fc region of the antibody. Tailoring various components in the antibody constructs, such as blocking analyte, linker or scaffold strands can dynamically modulate antibody switch conformation for the desired application conditions.

Applications

- Reversible, modular and programmable molecular switches for diverse applications, such as molecular diagnostics, biomedical imaging, point-of-care devices and home-use tests

- Antibody constructs can specifically bind to biological or chemical target analytes, such as small molecules, peptides, drugs, glycans, proteins, DNA, etc.
- Efficient target analyte detection in solution-based or surface-tethered measurements

Advantages

- Antibody construct can be modulated to have rapid, quantitative, sensitive and multiplexed target analyte detection in complex systems
- Antibody construct can be a single antibody or a scaffolded double antibody
- Compatible with an array of detection readouts, such as optical, electrical, electrochemical, nuclear magnetic resonance or a biological signal

Patents

- Published Application: [WO2022081541](#)
- Published Application: [20230408498](#)

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