

Technology Opportunity, Ref. No. UZ-24/070

Blinkognition - A novel method for single-molecule protein identification

The Challenge: Proteins are the most important markers of disease but, currently, we are unable to detect them in biological samples with high sensitivity and across a large dynamic range. Sequencing methods used for DNA analysis are inadequate to study proteins, thus new methods are needed to fill this gap and enable proteomic analyses with single-molecule sensitivity.

The Solution: Single-molecule sensitivity is necessary to detect many important protein biomarkers, and fluorescence is one of the few readouts that can be routinely used to detect single molecules. Typical fluorophores, however, emit a constant signal with little information about their environment. In contrast, spontaneously blinking fluorophores switch between ON and OFF states, giving an oscillating, single-molecule signal (blinking pattern) that contains rich information about their environment. We demonstrated that when such fluorophores are attached to a peptide, their blinking pattern can be analyzed using a deep learning algorithm to determine the identity of the peptide (see illustration on page 2)

Keywords Single-molecule peptide sequencing, Single-Molecule Peptide Identification

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Reference Püntener, Salome; Rivera-Fuentes, Pablo (2023). [Single-Molecule Peptide Identification Using Fluorescence Blinking Fingerprints](#). Journal of the American Chemical Society, 145(2):1441-1447.

Explainer Video https://youtu.be/gEZOPI4Nm_k

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