SPECTRAL FLUCTUATION RAMAN SPECTROSCOPY (SFRS)

Tech ID: 32999 / UC Case 2023-058-0

PATENT STATUS

Country	Type	Number	Dated	Case
European Patent Office	Published Application	WO 2025/058659	03/20/2025	2023-058

Additional Patent Pending

BRIEF DESCRIPTION

Our ability to experimentally measure the biomacromolecular structure of proteins and their complexes down to the atomic scale has progressed at a staggering pace in recent years. However, the dynamical conformational changes that affect, to name a few examples, DNA transcription, energy-transfer in photosynthesis and enzyme activity, and the transition from healthy to diseased states, remain difficult to capture. A non-perturbative, label-free approach that is sensitive to individual conformational states is single-protein Raman spectroscopy. However, the time resolution of single-protein Raman spectroscopy is typically limited to milliseconds (10^{-3} sec), limited by inherent signal strength. Protein conformational dynamics occur over a timescale ranging from tens of seconds down to microseconds (10^{-6} sec) or even nanoseconds (10^{-9} sec).

To address these challenges UC Berkeley researchers have developed a novel, high-temporal dynamic range Raman spectrometer capable of measuring sub-microsecond, and even nanosecond, fluctuations in single- and few-molecule spectra. The available dynamic range can be used to study and control of biomolecular dynamics as related to protein-protein interactions, drug discovery, validating computational biophysics capabilities, and many other additional applications.

SUGGESTED USES

- Multi-timescale, single-molecule Raman spectroscopy
- Sub-microsecond resolution, down to picosecond scale
- Label-free characterization of protein conformational states

ADVANTAGES

- Experimental measurement of protein dynamics and protein-protein interactions
- Drug discovery
- Advancing computational biophysics
- Materials science, surface science, analytical chemistry, catalysis, and biomedical diagnostics

RELATED MATERIALS

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INVENTORS

- Utzat, Hendrik

OTHER INFORMATION

KEYWORDS

Protein structure, Protein folding, DNA sequencing, Raman spectroscopy, Biomoleculat dynamics, Spectroscopy

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Biotechnology**
  - Bioinformatics
  - Genomics
  - Health
  - Proteomics
- **Imaging**
  - Medical
  - Molecular
- **Medical**
  - Diagnostics
  - Imaging
  - Research Tools
- **Nanotechnology**
  - NanoBio

» **Research Tools**

» Bioinformatics

» Nucleic Acids/DNA/RNA

RELATED CASES

2023-058-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ Improved Surface Enhanced Raman Spectroscopic (SERS) Method Operating in the Shortwave Infrared

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