GEORGE MASON UNIVERSITY

DNA-BASED NEAR-INFRARED VOLTAGE SENSORS

GMU-24-007

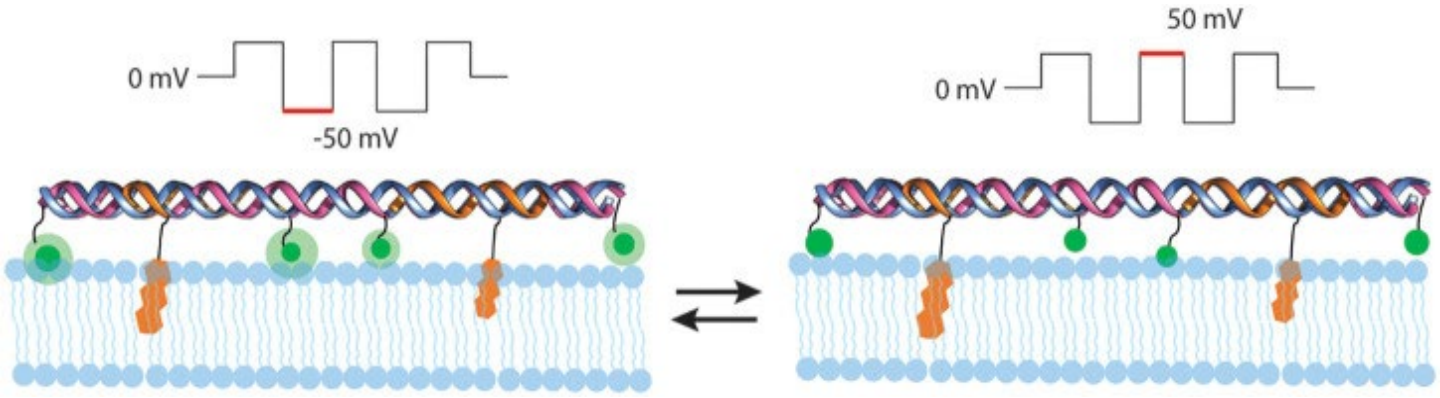
ENHANCING VOLTAGE DETECTION WITH PRECISION DNA NANOTECHNOLOGY

DNA-based Near-Infrared Voltage Sensors (DIVIN) offer a novel approach to voltage sensing, utilizing unique properties of DNA origami and near-infrared (NIR) fluorophores for precise and efficient detection of voltage changes in biological tissues. These sensors are engineered to provide real-time voltage mapping with high sensitivity, stability and biocompatibility, making them ideal for applications in neurobiology, cardiac research, and cellular electrophysiology.

Key Features

- **DNA Origami-Based Design:** Harnesses the precision of DNA folding techniques for reliable sensor assembly and function
- **NIR Fluorophores:** Utilizes Indocyanine Green (ICG) for enhanced tissue penetration and minimized phototoxicity
- **High Sensitivity:** Detects subtle voltage changes with high temporal resolution, useful in both *in vitro* and *in vivo* environments
- **Biocompatibility:** Engineered for safe use in biological systems, offering minimal toxicity and tissue interference
- **Stability in Biological Fluids:** Proven stability in serum and blood, ensuring consistent performance in long-term experiments

This technology provides cutting-edge tools for advanced biological research, enabling deeper insights into cellular and tissue-level voltage dynamics with minimal invasiveness.



Enhanced NIR-DNA Voltage Sensors Using ICG Monomers

This novel sensor technology leverages FDA-approved ICG for fluorescence imaging. Researchers at Mason overcame ICG's drawbacks – such as concentration-dependent aggregation, nonspecific targeting, and rapid photobleaching – by attaching ICG monomers to DNA origami structure with cholesterol. This design stabilizes ICG at desired concentrations, preserves its NIR absorbance, and allows for the addition of specific targeting moieties, enhancing voltage sensing accuracy in biological tissue.

For More Information contact:
George Mason University, Office of Technology Transfer
703-993-8933 ott@gmu.edu https://ott.gmu.edu/