

ANALYTICAL SEMINAR

Crosstalk Control in Multiplexed CRISPR Biosensing

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Multiplexed CRISPR-based biosensing is a promising strategy for detecting multiple nucleic acid targets in a single reaction, providing rapid and sensitive molecular diagnostics. However, signal crosstalk caused by non-specific cleavage of fluorescent reporters limits its accuracy and multiplexing capability. To overcome this challenge, researchers have developed orthogonal enzymes systems and spatial separation strategies to control crosstalk. Orthogonal enzymes systems use CRISPR enzymes with distinct substrate preferences, while spatial separation strategy confines reactions into microfluidic compartments to prevent interference. These designs enable reliable, high-throughput detection with improved signal selectivity and quantitative precision. As instrumentation and probe chemistry continue to develop, crosstalk-controlled multiplexed CRISPR assays hold great potential for clinical diagnostics, environmental monitoring, and on-site testing, providing a fast and accessible tool for comprehensive molecular analysis.



Tuesday, November 11, 2025



3:30 pm



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ANALYTICAL SEMINAR

Transient Bioelectronics: In-Vivo Elucidation of Neural and Cardiac Pathways using Biodegradable Microelectrodes

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Advances in bioanalytical chemistry have revolutionized our understanding of complex physiological processes, yet achieving real-time, high-resolution in vivo analysis remains a challenge due to safety issues and device-removal risks. Biodegradable microelectrodes offer a solution. Comprised of biodegradable materials that safely degrade after use, these electrodes minimize tissue damage and eliminate the need for extraction, reducing patient risk without sacrificing analytical performance. With diameters on the order of 1–100 μm , these microelectrodes provide exceptional spatial sensitivity, enabling the dynamic monitoring of ionic fluxes in neural pathways to probe neurological disorders, and the elucidation of cardiovascular dynamics to improve our understanding of the heart which will aid us in the fight against one of the leading causes of death: heart disease. Recent breakthroughs demonstrate that biodegradable microelectrodes can deliver reliable, long-term in vivo recordings while minimizing the amount of tissue/nerve damage and producing a mild immune response. These advances position transient microelectrode technologies at the forefront of next-generation analytical tools for neuroscience and cardiology, promising safer, more insightful studies of the living body.



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Expanding the SRS Microscopy Toolbox with Cumulene Probes and Polyyne-based Ratiometric Sensors.

Ali Farzam

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Stimulated Raman Scattering (SRS) microscopy is a powerful biological imaging technique, owing to the large multiplexing capability of the “cell-silent” Raman window. While SRS microscopy can be performed without the use of dyes, the development of vibrational probes has enabled improved visualization of subcellular compartments and the selectivity of imaged biological species. Previous work with polyyne-based probes has demonstrated the principles of probe design and enabled highly multiplexed live cell imaging, however, large regions of the cell-silent Raman window remain unutilized. This seminar will discuss the design of a novel class of cumulene-based Raman dyes that expands the utilized portion of the cell-silent region. As well, advancements in polyyne-based probes have yielded ratiometric sensors that report on enzyme activity and intracellular peroxide levels. These developments have expanded the multiplexing capability of SRS microscopy and enabled the visualization of downstream effects of drug treatment on subcellular organization.



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