The Chinese University of Hong Kong
Department of Biomedical Engineering

Graduate Seminar – PhD Oral Defence

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Date	***:***	19 June 2024
Time	***:***	10:00 am
Venue	***:***	Room 404, William M W Mong Engineering Building, CUHK

Title: Advancements in Biomedical Biosensing: Stress Responses, Enzyme Activity, and Cytokine-aptamer Detection

Biosensing, an interdisciplinary field bridging biology, chemistry, and engineering, is driving transformative advancements in detection methodologies. By leveraging the inherent selectivity of molecular interactions, biosensors can distinguish between closely related molecules, enabling precise and accurate detection. Biomarkers, being linked to physiological states of medical conditions, play a crucial role in facilitating quantifiable and accurate assessments. This research explores the nuances of biomolecular recognition, particularly focusing on DNA-protein interactions and the development of sensitive detection techniques for cytokine biomarkers. The work investigates the potential of topoisomerase 1 enzyme activity as a biomarker of thermal stress, shedding light on cellular stress responses. It introduces a novel hydrogel bead-based isothermal detection (BEAD-ID) scheme for simplified and versatile enzyme activity quantification, with promising potential for widespread application in biosensing. Furthermore, the research presents an enhanced surface plasmon resonance (SPR) platform leveraging the ultra-sensitive Goos-Hänchen (GH) shift to detect TNF-α, a cytokine biomarker relevant in cancer, at femtomolar levels. Utilizing aptamer-based recognition, this GH-aptasensing setup exhibits exceptional sensitivity, signaling its capacity to revolutionize biomarker evaluation and detection methodologies. Overall, these advancements seek to unravel the complexities of DNA-protein interactions for biomarker evaluation and to pioneer innovative methodologies for facile and sensitive biomarker detection. By capitalizing on distinct recognition events between analytes and bioreceptors, these developments may pave the way for more effective biomarker detection and evaluation in diverse contexts.

***** ALL ARE WELCOME *****

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