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10:00am – 3rd Floor of Atrium

Plasmonics-based Nanobiosensor for Gastrointestinal Cancer Diagnostics via MicroRNA Biomarker Detection

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Development of simple techniques for efficient detection of nucleic acids, including disease biomarkers such as microRNAs, is essential for clinical diagnostics. MicroRNAs (miRNAs) have demonstrated great promise as a new important class of biomarkers for early detection of various cancers as well as for investigation of cancer development and progression, yet these small molecules have not been adopted into early diagnostics for clinical practice because of challenging analytical aspects in the lab. The technology described herein is a conceptually simple and selective plasmonics-based nanobiosensor for specific nucleic acid target identification with surface-enhanced Raman scattering (SERS) detection. This SERS nanobiosensor is a label-free and rapid nanoparticle-based biosensing system with applicability towards miRNA biomarkers for gastrointestinal cancers. Non-enzymatic DNA strand-displacement hybridization allows nucleic acid diagnostics based on an “OFF-to-ON” signal switch upon nucleic acid target capture. A limit of detection of 200 attomoles has been realized in the current bioassay system with high specificity for single nucleotide mismatch discrimination. This molecular analysis tool has shown great potential to simultaneously measure multiple miRNA biomarkers for Barrett’s esophagus as well as esophageal adenocarcinoma.

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