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# Whole-cell *Pseudomonas aeruginosa* detection using a localized surface plasmon resonance aptasensor

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Whole-cell *Pseudomonas aeruginosa* detection using a localized surface plasmon resonance aptasensor: this is a label-free, sensitive, and selective biosensor to detect whole-cell *Pseudomonas aeruginosa* strain PAO1 using localized surface plasmon resonance (LSPR). This aptasensor is designed to address challenges associated with the direct and specific detection of bacteria in health care settings. Nanosphere lithography was used to fabricate a sensor surface containing a hexagonal array of Au nanotriangles which exhibits LSPR property. The sensor surface was subsequently modified with biotinylated polyethylene glycol (Bt-PEG) thiol/ PEG thiol (1:3), neutravidin, and biotinylated aptamer in a sandwich format. The 1:3 (v/v) ratio of Bt-PEG thiol/PEG thiol was specifically chosen to maximize PAO1 binding, while minimizing nonspecific adsorption and steric hindrance. The surface confined biotinylated aptamer is used to capture whole-cell PAO1 onto sensor surface with high affinity. In contrast to prior whole-cell LSPR work, the observed LSPR wavelength shift was shown to be linearly related to bacterial load in solution over a range of 10 - $10^3$ cfu/mL-1. This LSPR sensing platform is rapid (~3 h for detection), sensitive (down to a single bacterial cell level), selective for detection of Pseudomonas strain PAO1 over other strains, and it exhibits a clinically relevant dynamic range and excellent shelf-life (≥ 4 months) when stored at ambient conditions. This versatile LSPR sensing platform should be extendable to a wide range of supermolecular analytes, including both bacteria and viruses, by simply switching affinity reagent, and it has potential to be used in point-of-care applications..

## Biography

Jiayun Hu has completed her BSc in Biochemistry from both the Shanghai Ocean University and the Florida Institute of Technology in 2010. She has earned her MS degree in Chemistry from Illinois State University in 2013. She has joined the PhD program in the Department of Chemistry and Biochemistry at the University of Notre Dame in 2013. As a Graduate student working with Professor Paul Bohn, she is interested in problems at the junction of analytical chemistry, surface chemistry and nanoscience, and microbiology. She is currently developing a label-free, sensitive, and selective biosensor to detect whole-cell bacteria in both buffer and blood samples.

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