Label-free SPR and SPRi analysis with plasmonic microarrays and calcinated nanofilms

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 Label-free detection of molecular interactions presents an attractive alternative to traditional label-based techniques such as fluorescence. As one of the most advanced label free techniques, surface plasmon resonance (SPR) continues to be at the forefront of evolving sensing technology. However, there are still challenging issues for SPR and SPR imaging methods, in particular acquisition of quality raw data for imaging analysis and limited success towards orthogonal detection. This seminar will discuss several new strategies in the design of high performing SPR biochips. Using spatial variation of the metal thickness and resonance confinement, manipulation of the metal film leads to attenuation of the evanescent field in the background area, while enabling the excitation of SPPs inside the desired patterns. In addition, micro-patterned glass substrate is developed to de-couple resonance in the resonance angle between the wells and the surrounding area, resulting in the isolation of the array spot resonance with a significant reduction of the background signal. Fabrication of calcinated nanofilms for facilitating the establishment of biomimetic interfaces will be presented. Nanoscale silicate layers are constructed with a layer-by-layer (LbL) deposition/calcination process, where photolithographic techniques can be applied to generate various structures including channels and microarrays for throughput study. Calcination of nanoparticle-based monolayer plasmonic films has also been developed for improving sensitivity and enabling orthogonal detection including onchip mass spectrometry and SERS analysis. Applications of the calcinated nanofilms in membrane stability assessment, signal amplification towards ultrasensitive detection, and *in situ* construction of a polymer coating for investigation of cell adhesion using host-guest reactions will be presented.

**Reference:**

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