Real-Time Detection of Label-Free Protein Adsorption

Published date: June 11, 2013

Technology description

Background

Ellipsometry is a well-established technique that is used in a number of industrial applications. Second harmonic generation (SHG) surface selectivity can be coupled with the reasonably high sensitivity of simple instrumentation to biosensing applications. Recent developments in real-time optical sensing approaches present attractive alternatives to other optical-based sensing techniques to in situ detection of unlabeled proteins.

Technology Summary

Researchers at Purdue University have developed a method for the novel use of nonlinear optical null ellipsometry for background-free, real-time biosensing of protein/surface interactions. Adsorption of bovine serum albumin (BSA) at silica/aqueous solution interfaces was used to induce a change in the polarization state of frequency-doubled light. This change in polarization is translated through weak, dynamic interactions with a co-absorbed nonlinear optical probe molecule. Signals arising from surface interactions with BSA were spatially isolated and selectively detected during BSA adsorption and confirmed conformational changes within the protein layer, consistent with denaturation. This technology allows for chiral-specific detection in small sample sizes with unprecedented sensitivity to chirality and requiring relatively simple instrumentation. Chiral synthesis, separation, and detection are hot topics and current optical detection methods are not particularly sensitive to chirality.

Application area

Chemical Analysis
Biosensors

Advantages

Greater flexibility of selection
Better retention and content of phase information

Nonlinear sensitivity to changes

Institution

Purdue University

Inventors

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