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Label-Free Optical Monitoring of Proteolytic Reaction Products Using Nanoporous Silica Colloidal Assembly

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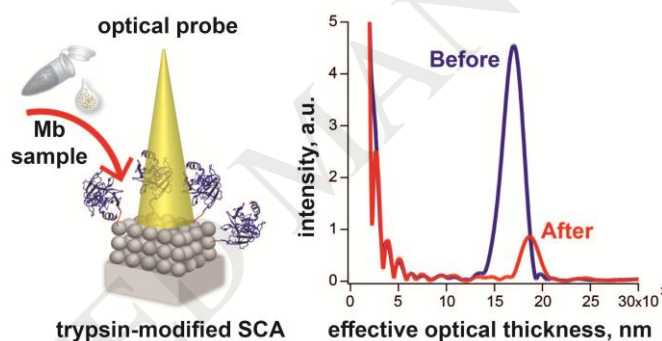
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Optical Monitoring of Proteolytic Activity



Highlights

- Label-free optical biosensor based on multifunctional silica colloidal assembly (SCA)
- Effective optical thickness is highly sensitive to biomolecules within the nanostructure
- SCA acts as a size-exclusion element to entrap and to concentrate enzymatic degradation products
- Biosensor can be coupled to downstream mass spectrometry analysis

ABSTRACT: An optical biosensor for rapid monitoring of proteolytic activity is constructed by immobilization of proteases onto multifunctional silica colloidal assembly (SCA). The SCA serves as Fabry-Pérot thin film, which is highly sensitive to the presence of biomolecules (e.g., enzymes, proteins and short peptides) within the nanostructure. Moreover, the SCA acts as a size-exclusion element, allowing to entrap and to concentrate the enzymatic degradation products for downstream mass spectrometry analysis for substrate profiling and cleavage sites identification.

KEYWORDS: Biosensors, Colloidal Assembly, Enzyme, Protease, Mass Spectrometry, Silica,

1. Introduction

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