

18th International Conference on

World Analytical Chemistry & Mass Spectrometry & World HPLC, Separation Techniques & Pharmacovigilance

August 29-30, 2018 | Toronto, Canada

Biosensing approaches for lysozyme detection with graphene oxide-coated plasmonic interfaces

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Lysozyme is used as a model to study protein function and enzyme catalysis, is suggested as a biomarker in various diseases and also used as an antimicrobial agent in the food industry. Various methods have been reported for lysozyme detection based on its physicochemical properties, enzymatic activity or affinity for biological receptors. The aptasensors with detection by Surface Plasmon Resonance (SPR) developed by our group are versatile tools for the detection of residual lysozyme in wines or of lysozyme dimer in aggregated solutions. Advancing from these concepts relying on thiol coated plasmonic interfaces, we report the development of graphene oxide (GO) coated plasmonic interfaces via the layer-by-layer method, as robust and sensitive platforms with controlled thickness. Furthermore, the GO-coated interfaces were easily modified with whole cells of *Micrococcus lysodeikticus*- an enzymatic substrate for lysozyme. Detection of lysozyme in spiked serum samples was achieved on the principle of lysozyme's lytic action causing desorption of bacteria from the interfaces and consequently changes in the SPR signal. The analysis time was 3 minutes and the detection limit was 3.5 nM. A second sensing concept exploited the affinity of lysozyme for an aptamer, fixed covalently to the GO-coated interfaces. In this case, a detection limit of 0.71 nM and a linear range of 2-21 nM were observed. The two analytical strategies are based on different sensing mechanisms, nonetheless, both are sensitive and easy to implement with GO-coated interfaces suggesting a high potential and versatility of these interfaces for bioanalytical purposes.

Biography

Alina Vasilescu has completed joint Ph.D. studies from the University of Bucharest, Romania and University of Perpignan, France and postdoctoral studies from University of Toronto, Canada. She has worked in analytical development in the pharmaceutical industry and is currently a researcher at the International Centre of Biodynamics in Bucharest, Romania working on practical applications of biosensors. She has published more than 30 papers in the field of biosensors.

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