

Nanoplasmonic Sensor Arrays: Principles and Applications

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Abstract

The emergence of sensor arrays, as a promising high throughput sensing method, provides a powerful analytical approach with novel performance for simultaneous detection and discrimination of multi-analytes in biological and environmental samples. In contrast to the lock and-key sensing approach that demands a particular receptor for detecting a single analyte, utilization of cross-reactive sensing elements in sensor array systems paves the way for the simultaneous recognition and discrimination of groups of target species. The design of cross reactive sensing elements is known as the heart of array-based sensing systems and it is recognized as a pivotal step in the application of sensor arrays. Among numerous chemical compounds (e.g. chemoresponsive dyes, porphyrins, synthetic polymers, etc.) used as sensing elements, the emergence of plasmonic nanoparticles (NPs) can be considered a milestone in the sensor element design. Fascinating surface properties of plasmonic NPs, ease of surface modification, good stability, tunable physicochemical properties, and size and environmental dependent optical properties, make plasmonic NPs powerful candidates in array-based sensing platforms. Over the past few years, optical sensor arrays based on these plasmonic NPs have been employed for the detection/discrimination of a wide range of analytes including proteins, pathogenic bacteria, cells, disease biomarkers, pesticides, and metallic ions, and explosives. This presentation will cover the principle of nanoplasmonic sensor arrays. Moreover, the application of nanoplasmonic sensor arrays along with sensing mechanisms will be thoroughly discussed.

Received Date: 3 July, 2022

Accepted Date: 10 July, 2022

Published Date: 29 July, 2022

Biography

Dr. Forough Ghasemi received her MSc and PhD in Analytical Chemistry at the Sharif University of Technology, Tehran, Iran, in 2012 and 2016, respectively. She completed two postdoctoral fellowships at Tehran University of Medical Sciences (2017) and Sharif University of Technology (2018). Since 2019, she has been an Assistant Professor at the Department of Nanotechnology, Agricultural Biotechnology Research Institute of Iran (ABRII). Her research interests include plasmonic and luminescent nanoparticles, the design of colorimetric and fluorometric sensors, and the development of electronic tongues for medicinal, agricultural, and environmental purposes.