

Quartz crystal microbalance (QCM) based nanobiosensors: An effective tool for pathogen detection

Prashant Singh
DAV College, India

Pathogen detection and its analysis are critical for medicine, food safety, agriculture, public health and biosecurity. Many current microbial detection approaches are based on century-old culturing methods, which are reliable but slow and provide relatively little information about the pathogens and also are not adaptable to high throughput operations. The availability of many instruments, procedures and techniques like spectrophotometer, calorimeter, flow cytometer, polymerase chain reaction, spectroscopy etc. need costly equipments and highly skilled personnel to limit their practical use, which creates a demand for development of a low cost diagnostic tool with very high sensitivity and specificity; and quartz crystal microbalance (QCM) based nanobiosensors best meet this requirement.

QCM based nanobiosensors could be a thrilling alternative to the traditional methods for the detection of pathogens by enhancing its efficacy and efficiency by suitable nanomaterials. In the recent years, many workers have started employing nanomaterials in QCM to develop the nano-biosensors. This strategy could be seen as a key to yielding devices and demonstrates rapid responses combined with high sensitivities. Indeed, these traits have nearly become standard attributes of this technological combination and arise from the extremely high surface and small size nanostructure areas as nanotubes, nanopores, nanowires and nanoparticles. In view of above, it is acceptable to state that QCM based nanobiosensor has the potential to increase sensitivity and specificity, speed up the detection and enable high-throughput analysis. In the present study, the employment of nanomaterials in QCM have been critically reviewed and categorically analysed on the performance basis.

Biography

Prashant Singh is presently working as Associate Professor at Department of Chemistry, DAV (PG) College Dehradun, Uttarakhand, India since 2000. He obtained his Ph.D. degree in Chemistry from University of Roorkee, Roorkee (Presently Indian Institute of Technology, Roorkee), India in 1996. Dr. Singh has published over 60 research papers in national and international journals. His research interests are water chemistry, environmental sciences and nano-biosensors for water characteristics. He is engaged in promoting and popularizing Science and Technology in the state. He is presently the Chief Editor of a reputed journal 'Analytical Chemistry Letters' published by Taylor and Francis.

prashantraj86@yahoo.com