International Conference and Expo on Water Microbiology & Novel Technologies July 18-19, 2016 Chicago, USA

Macromolecular fingerprinting in sol-gel materials for rapid bacterial recognition in water samples via QCM detection

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Currently, the importance of early detection for microbial contamination of water samples is substantial in areas like food production, water supply or recreational water. Well established chemical and biological detection methods are highly suitable for this task and yield the desired detection limits, but their main drawback is analysis time interval being time consuming for a rapid real-time detection. This attribute was the basis for the idea of using molecularly imprinted sol-gel based QCM biosensor for rapid and selective bacterial recognition in liquid samples. Molecularly imprinted sol-gel derived thin films with different pathogenic microbial cells previously showed to be an easy and selective method for specific bacterial recognition from liquid. An important feature in the imprinting process is molecular fingerprints left by microorganisms alongside morphology, into imprinted film cavities that are complementary to the template molecule in size, shape and chemical functionality. In the present study, a method for rapid and selective bacterial recognition was developed as a quartz crystal microbalance (QCM) based biosensor. QCM probes were coated with sol-gel derived thin films and modified with a surface-imprinting process using different bacteria (including pathogens) such as: *Staphylococcus aureus, Deinococcus radiodurans, E. coli* CN_{13} , *Pseudomonas aeruginosa* and *Flavobacterium breve*. Preliminary results show that imprinted films on sensor surface showed high selectivity and sensitivity towards the experimental template bacteria (*S. aureus*) along the adsorption process from water. The sensitivity of present QCM imprinted probes is ~102 CFU/ml, allowing this method to be a promising technique for selective detection and quantification of bacteria present in liquids in real time intervals.

Biography

Robert Armon is the Head of Environmental Microbiology Lab, Faculty of Civil & Environmental Engineering and has 27 years of experience in Environmental Microbiology, 7 Patents, 96 Publication and 2 Books.

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