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Association of a Love wave sensor to thin film molecularly imprinted polymers for nucleotides nanoparticles detection

Naima Lebal[1], H. Hallil[1], C. Dejous[1], A. Krstulja[2], R. Delepée[2], D. Rebière[1] and L. Agrofoglio[2]
[1]University of Bordeaux, France
[2]University of Orleans, France

The overall objective of this work is to develop and to validate a quantitative, noninvasive diagnosis tool to monitor the efficiency of colorectal cancer chemotherapy. Our methodology takes advantage from the high sensitivity of acoustic biosensor combined with high selectivity and robustness of thin film Molecularly Imprinted Polymers (MIPs) to detect tumor markers (nucleosides nanoparticles). The first step consists in developing a process for thin film MIP coating based on commercial nucleotides Adenosine Mono Phosphate (AMP), to verify the compatibility of the MIP film with acoustic propagation and the sensor sensitivity for the rebinding of AMP.

We chose a MIP surface imprinting strategy, where the polymer film thickness was adjusted in order to establish the optimal film thickness value to meet the sensor insertion losses requirements. Scanning Electron Microscopy (SEM) images reveals the film surface morphology and the pores sizes (500nm to 1 μm). The sensor response was recorded in terms of frequency shift and insertion losses using a network analyzer. The MIP based sensor showed a frequency shift estimated to 6875 Hz for 25ppm AMP concentration. The MIP layer associated to our sensor offers a good stability compared to natural recognition, knowing that sensitivity can be further improved by optimizing the MIP layer. Simplicity of the obtained sensor makes it an attractive candidate as a nucleoside detector for colorectal cancer diagnosis. We work currently on the integration of a new MIP coating based on nucleosides instead of nucleotides. We also envisage associating a microfluidic system for real time detection.

Biography

N. Lebal is a Ph.D. student at IMS laboratory working on Biosensors.

naima.lebal@u-bordeaux1.fr