A novel molecular imprinting approach for lysozyme detection

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Abstract: Lysozyme (N-acetylmuramidase glycanhydrolase) is an antibacterial enzyme belonging to the innate immune system. It can be found in secretions such as mucus, tears and saliva. Its principal role is to hydrolyze glycosidic bonds in peptidoglycans of Gram-positive bacteria. Since presence of this protein is inevitable for human life, it is necessary to identify lysozyme content in secretions or blood. Current detection methods depend on Micrococcus lysodeikticus cells and aptamers. Also enzyme-linked immunosorbent assays have already been developed. In recent times, usage of molecularly imprinted polymers (MIPs) is taking off. These polymers combine high selectivity with sensitivity. Drawbacks of previous mentioned techniques, such as high cost, can be also overcome. In this process, a matrix forms around a specific template. Removal of the analyte results in memory-shaped cavities where only lysozyme could rebind through chemical and steric interactions. Afterwards, this complex is coated onto quartz crystal microbalance (QCM). Combination of these two techniques has already been proven successful in the past. This work will discuss the synthesis and choice of polymers chosen as well as the sensitivity and selectivity of the sensor towards lysozyme in the range of 5-1000 mg/L.

Keywords: Lysozyme, Molecular imprinting, Quartz crystal microbalance