Development of Molecular Imprinting Techniques for VOCs detection

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In this study, our goal is to achieve parts per million (ppm) detection of volatile organic compounds (VOCs) using a quartz crystal microbalance (QCM). To achieve the goal, many developments for enhancing the sensitivity and selectivity are necessary. A large and active surface area is essentially required to increase the sensitivity of for target VOCs. In order to increase the surface area, polymer thin films having opposite charge polarity were laminated through layer-by-layer (LBL) techniques. To increase selectivity molecular imprinting techniques were used to fabricate functional polymer thin films deposited QCM chips during the LBL process. In this way, a molecular imprinted LBL multilayer chip was fabricated. In the result, we found that the response of the MIP multilayered chip was larger than that of the non-imprinted chip, the sensitivity was changed drastically with the change of the thin film thickness, and the qualitative analysis was also obtained for the VOCs. The principle of qualitative analysis was based on the simultaneous measurement of ΔR / ΔF value when the chip was exposed to various VOCs.