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A Novel Mass-Sensitive Sensor Based on β-Cyclodextrin-Anchored Bisphenol A-Imprinted TiO_2 Ultrathin Layers

Seung-Woo Lee*, Naoki Takahara, Sergiy Korposh,
Do-Hyeon Yang and Toyoki Kunitake

Graduate School of Environmental Engineering, The University of Kitakyushu,
1-1 Hibikino, Kitakyushu 808-0135, Japan

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A novel approach to fabricating artificial receptors based on the synergic effect of molecular imprinting and host (β-cyclodextrin)-guest (bisphenol A, BPA) interaction in TiO_2 ultrathin films prepared by the gas-phase surface sol-gel process was reported. Quartz crystal microbalance (QCM) electrodes were used to confirm the mass-sensitive change due to BPA incorporation and guest binding into the film with the aim of developing a BPA sensor. The concentration of 1 μM (272 ppb) BPA was successfully measured and the limit of detection was estimated to be 0.1 μM (27.2 ppb) BPA. The affinity of the imprinted film to BPA, which was calculated using a Benesi-Hildebrand plot, was ca. 8 times higher than that of the nonimprinted film. This selective binding feature in principle can be applied to more complex organic compounds.

*Corresponding author: e-mail: leesw@env.kitakyu-u.ac.jp