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Abstract

Semi-Covalent Imprinting for Selective Protein Sensing at a Femtomolar Concentration Level †

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Protein imprinting is challenging mainly because of their large molecular size. It is very difficult to estimate which and how many groups on the protein template molecule surface are accessible for binding. To overcome this drawback, we introduced semi-covalent protein imprinting [1]. We prepared a conducting molecularly imprinted polymer (MIP) based on bis(2,2′-bithien-5-yl)methane for human serum albumin (HSA) determination. A very high imprinting factor (IF > 20) and selectivity of the devised chemosensor proved that the MIP featured molecular cavities of well-defined structure and high affinity to HSA. This success encouraged us to improve this approach even further. For that, we prepared a new artificial receptor material in the form of a thin macroporous MIP film with an unprecedented hierarchical nanostructure controlled at three different size scale levels [2]. The introduction of this nanostructure resulted in the extraordinary properties of this recognizing material. That is, its very high selectivity of MIP based extended-gate field-effect transistor (EG-FET) chemosensor was accompanied by high sensitivity and detectability at an impressive femtomolar concentration level. These analytical parameters were among the best reported in literature not only for MIP chemosensors but in the field of bio- and chemosensors in general.

References

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