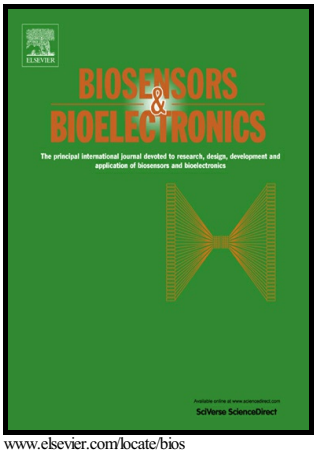

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Synthesis of Hydrophilic and Conductive Molecularly Imprinted Polyaniline Particles for the Sensitive and Selective Protein Detection

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Abstract:

In this work, a novel kind of water-dispersible molecular imprinted conductive polyaniline particles was prepared through a facile and efficient macromolecular co-assembly of polyaniline with amphiphilic copolymer, and applied as the molecular recognition element to construct protein electrochemical sensor. In our strategy, an amphiphilic copolymer P(AMPS-*co*-St) was first synthesized using 2-acrylamido-2-methyl-1-propanesulfonic acid (AMPS) and styrene (St) as monomer, which could co-assemble with PANI in aqueous solution to generate PANI particles driven by the electrostatic interaction. During this process, ovalbumin (OVA) as template protein was added and trapped into the PANI NPs particles owing to their interactions, resulting in the formation of molecular imprinted polyaniline (MIP-PANI) particles. When utilizing the MIP-PANI particles as recognition element, the resultant imprinted PANI sensor not only exhibited good selectivity toward template protein (the imprinting factor α is 5.31), but also a wide linear range over OVA concentration from 10^{-11} to 10^{-6} mg mL^{-1} with a significantly lower detection limit of 10^{-12} mg mL^{-1}, which outperformed most of reported OVA detecting methods. In addition, an ultrafast response time of less than 3 min has also been demonstrated. The superior performance is ascribed to the water compatibility, large specific surface area of PANI particles and the electrical conductivity of PANI which provides a direct path for the