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Magnetic molecularly imprinted polymer for the isolation and detection of biotin and biotinylated biomolecules

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Abstract

Magnetic separation based on biologically-modified magnetic particles is a preconcentration procedure commonly integrated in magneto actuated platforms for the detection of a huge range of targets. However, the main drawback of this material is their stability and high cost. In this work, a novel hybrid molecularly-imprinted polymer with magnetic properties is presented with affinity towards biotin and biotinylated biomolecules. During the synthesis of the magneto core-shell particles, biotin was used as a template. The characterization of this material by microscopy techniques including SEM, TEM and confocal microscopy is presented. The application of the magnetic-MIPs for the detection of biotin and biotinylated DNA in magneto-actuated platforms is also described for the first time. The magnetic-MIP showed a significant immobilization capacity of biotinylated molecules, giving rise to a cheaper and a robust method (it is not required to be stored at 4° C) with high binding capacity for the separation and purification under magnetic actuation of a wide range of biotinylated molecules, and their downstream application including determination of their specific targets.

Keywords: Magnetic particles, biotin molecularly imprinted polymer, biotinylated biomolecules, magneto-actuated immunoassay, immunomagnetic separation

¹ These authors contributed equally to this work

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