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MOLECULARLY IMPRINTED NANOGELS COMBINED TO PLASTIC OPTICAL FIBRE FOR THE ULTRALOW DETECTION OF PROTEINS

R. Tatti[1], N. Cennamo[2], L. Zeni[2], A.M. Bossi[1]

[1]*Dipartimento di Biotecnologie, Università di Verona, Verona, Italy*
[2]*Dipartimento di ingegneria, Università della Campania Luigi Vanvitelli, Aversa, Italy*

Molecular imprinted polymers (MIPs) are synthetic materials with entailed recognition properties, prepared by a template assisted synthesis [1], that can target a wide spectrum of analytes, ranging from small molecules to proteins [2] and can be shaped in formats from micron- to nano-dimensions. Exhibiting recognition properties similar to antibodies and natural receptors, but the robustness and integrability to sensing devices typical of the polymeric materials, MIPs are envisaged as a promising receptor element for sensing purposes. Moreover downsizing the MIPs to nanodimensions (nanoMIPs) [3] offers significant advantages in terms of binding kinetics, accessibility of the binding sites, homogeneity of the imprints, quasi-protein-sized dimensions, strengthening further their resemblance to natural receptors.
Here we explored the potential of MIP nanogels, characterized by solvent-responsive properties, in plasmonic sensing on a D-shaped plastic optical fibre (POF) [1], this latter chosen for the versatility of configurations offered, the easy and low cost of manipulation, the great numerical aperture, the large diameter, the possibility to withstand smaller bend radii than glass, the use of white light sources and the remote interrogation.
The POF platform was covalently derivatized with the nanoMIPs resulting in a nanoMIP-POF sensing platform with homogeneous surface coverage and responsivity for solvents. The nanoMIP-POF platform selectivity and sensitivity was investigated, showing the ability to detect the model protein at ultralow concentrations and with femtomolar LOD.

References

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