

High Sensitive Magneto-Electro-Optic detection platforms

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Recent developments within the International Centre of Biodynamics concerning chip preparation as well as accomplishment of a measuring set-up allowing magneto-optic surface-plasmon-resonance (MOSPR^{1,2}) assays are presented. The platform comprises the magneto-plasmonic sensor, the surface plasmon resonance detection module, the electromagnet providing the oscillating magnetic field (with controlled field strength and frequency) with actuation role for MOSPR and the flow-through chamber with integrated microfluidics.

The physical transduction principle is based on the combination of the magneto-optic activity of magnetic materials and plasmonic properties of selected metallic layers. The actual structure of layers was optimized using a Transfer Matrix approach³⁻⁵ based on the magneto-optical activity of the trilayers as a function of the thickness and position of the Cr, Co and Au layers, and has been constructed in house via physical vapor deposition of thin layers of Cr, Au and Co.

Such combination can produce a significant enhancement of the SPR effects that strongly depends on the optical properties of the surrounding medium, allowing its use for biosensing applications². Calibration curves based on solutions with different refractive indices show a steeper slope in the case of the magneto-optical sensor proving an increased sensitivity. The sensing avenues emphasizing analytical capabilities of the platform e.g. to assess biomolecular reactions will be highlighted.

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