NANOSTRUCTURED MAGNETO-OPTIC TRANSDUCERS FOR BIOSENSING APPLICATIONS

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The functional characterization of a Magneto-Optic Surface Plasmon Resonance (MOSPR) biosensor is presented. Magneto-plasmonic nanostructures are used as transducing layers demonstrating the possibility to greatly improve the sensor performances with respect to traditional Surface Plasmon Resonance (SPR) sensors. The physical transduction principle is based on the combination of the magneto-optic (MO) activity of magnetic materials and surface plasmon resonance of metallic layers.
Such a combination can produce a great enhancement of the magneto-optic effects when the resonant condition is satisfied. Such enhancement is strongly localized at the surface plasmon resonance and strongly depends on the refractive index of the dielectric medium, allowing its use for optical sensing [1, 2].
As a consequence, small variations of the refractive index will induce large changes in the MO response, allowing to greatly improving the sensitivity of the MOSPR sensor with respect to traditional SPR sensor. A magnetic actuator is used to control the magnetization state of the magnetic layer in the transversal configuration, and the relative variations of the reflectivity are detected.
After a proper calibration routine of the biosensor, the novel transducer has been tested for the study of adsorption of Bovine Serum Albumin (BSA) protein onto the gold surface and its binding with its specific antibody. The sensing performances in terms of sensitivity, limit of detection, specificity are taken into account and compared with traditional SPR assay.

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