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# Nanostructured plasmonic thin films for LSPR sensing applications

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Localized Surface Plasmon Resonance (LSPR) phenomenon in materials with noble metal nanoparticles is a hot topic due to the unique optical properties of the nanoparticles. Their optical response can be tailored by changing the size, shape and distribution, as well as the refractive index of the surrounding dielectric matrix [1,2]. If the nanoparticles are embedded in a porous host matrix produced using a GLancing Angle Deposition (GLAD) system, analyte molecules should easily diffuse to the vicinity of the nanoparticles and induce subtle changes in the refractive index. These interactions can be detected by monitoring the shape of the LSPR band in transmittance mode (T-LSPR) [3,4] and, therefore, several transduction mechanisms can be used to build T-LSPR sensors.
This work combines (i) the preparation of nanostructured plasmonic thin films using the GLAD system, up to incidence angles of 85º, (ii) sensitivity studies using High-Resolution LSPR Spectroscopy and (iii) LSPR band processing. Refractive index sensitivity studies were conducted in a controlled atmosphere chamber with real-time T-LSPR monitoring. The obtained signals were then processed using an algorithm that analyses changes in several parameters of the LSPR band. The results showed that the films deposited with a higher GLAD angle manifest enhanced sensitivity to gaseous atmospheres, thus confirming the possibility of using these nanostructured plasmonic thin films as T-LSPR sensors.

[1] M.S. Rodrigues, et al., Appl. Surf. Sci. 438 (2018) 74–83.
[2] M.S. Rodrigues, et al., Appl. Sci., 11 (12) (2021), 5388
[3] M.S. Rodrigues, et al., Nanotechnology. 30 (2019) 225701.
[4] M.S. Rodrigues, et al., Software X, 12 (2020), 100522

## Scientific Area

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