

MAP-fis Essay Proposal, 2016-2017

(please write in English)

Supervisor

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Title

Nano-designed LSPR thin films using GLAD in reactive magnetron sputtering, for optical sensing.

Area

(Materials, Optics, Condensed Theory, High Energy Theory,...);

Materials - Applied Physics

Summary of Proposal

The present proposal integrates experimental and theoretical approaches in Materials' Science and Physics, while addressing a specific application: optical sensing [1]. The optical-sensing will consist of gas-selective sculptured thin films with 3D microstructure in the nanometer scale, with noble-metal nanoparticles (Au, Ag) embedded in an oxide dielectric matrix ($\text{TiO}_2, \text{Al}_2\text{O}_3$), exhibiting Localized Surface Plasmon Resonance (LSPR) [2-7]. Glancing Angle Deposition technique (GLAD) [8-10] by reactive magnetron sputtering will be used to prepare the films, which will then be subjected to annealing processes in order to tailor the (micro)structure to respond to application requirements. These nanometer-scaled architectures with large contact areas will be tailored to produce unique optical responses, within gas sensing-driven applications [7]. Growth mechanics, nanoparticle formation and optical responses of the nanostructured films will be investigated [4-7], including a detailed modeling protocol. This proposal will include the development of prototypes designed to evaluate adsorption of several gases and linear dependence of LSPR peak position with different gas concentrations.

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References

(to allow students first look at topic)



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