

MAP-fis Essay Proposal, 2016-2017

(please write in English)

Supervisor

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Title

Novel Ferroelectric Oxides for Photovoltaic Devices -
Towards Environmentally Friendly Solar Cells Based on Thin Films Oxides with Narrow Band Gap

Area

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

Materials

Summary of Proposal

This project opens an opportunity to establish a new scientific and technological approach for photovoltaic applications based on a recent generation of ferroelectric oxides. These innovative materials can be specifically designed to exhibit high polarizability and narrow energy band gap (~ 1.4 eV), which can easily generate photon-stimulated electron-holes pairs and simultaneously, prevent recombination of charge carriers by the intrinsic electric field. Main technical challenge is to optimize thin film materials combination in a planar architecture in order to achieve a functional device for efficient photovoltaic conversion. The use of non-toxic oxides (Bi, Zn, Ti, O) and non-contaminant methods assure an environment-friendly technology. Thin films deposition by rf-sputtering has advantages of reliability and compatibility with standard nano-electronic fabrication, directing the R&D work towards delivering sensors and solar cells prototypes envisaging commercially viable systems.



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References

(to allow students first look at topic)

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