

FINAL MASTER PROJECT PROPOSAL



Title

New colloidal nanocrystalline semiconductors for solar cells

Supervisor(s)

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Summary of the project

Solar cells based on nanocrystalline colloidal semiconductors show unique and promising properties. On one side, they are cheaper than traditional solar cells, because they are composed of abundant elements and their simple fabrication techniques. On another side, their optoelectronic properties can be tuned by changing the nanocrystal size or shape. Moreover, very recently, it has been reported that the position of their energy bands (valence and conduction band) can be modulated by changing the ligands on the nanocrystal surface. However, the best solar cell efficiencies have been achieved using highly toxic materials.

This project will focus on the development of new nanomaterials for solar cells composed of abundant, non-toxic elements.

MAIN TASKS of the project:

- Literature review. Colloidal nanocrystals: concept, use in photovoltaics, promising materials and strategies
- Synthesis and characterisation of new colloidal nanocrystals. Chemical and structural characterisation.
- Thin film fabrication using colloidal nanocrystals and different ligands. Optical characterisation. Energy bands position determination.
- Solar cell fabrication and characterisation
- Conclusions and prospects.

This project combines synthesis and characterisation of nanomaterials, and fabrication of thin films for their incorporation in devices. For that reason, it will be supervised by two researchers with complementary background.