



ERASMUS MUNDUS



## EUROPHOTONICS-POESII MASTER COURSE

### PROPOSAL FOR A MASTER THESIS

Dates: April 1<sup>st</sup>, 2016 – September 30<sup>th</sup>, 2016

**Laboratory : Functional Optoelectronic Nanomaterials**

**City, Country : Barcelona, Spain**

**Title of the master thesis : Hybrid colloidal quantum dot – 2D (graphene) material solar cells**

**Name of the tutor of the master thesis :** Gerasimos Konstantatos

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#### **Summary of the subject (maximum 1 page) :**

The goal of this project is the investigation of hybrid material platforms consisting of colloidal quantum dots and 2D materials (incl. graphene and metal-chalcogenides) for the development of novel high performance low-cost solar cells. The candidate will be involved in the fabrication and characterization of the solar cell devices and will contribute also to optimization strategies at a material and device level. Understanding the properties of this novel type of heterojunction formed between 0-dimensional and 2-dimensional material platforms is essential for the development of a whole new architectural platform for optoelectronics beyond solar cells. The candidate will join an interdisciplinary group of chemists, physicists and engineers and will receive significant training on the fabrication and characterization of the devices. Specific topics to be addressed are:

- a. Graphene based colloidal quantum dot tandem solar cells
- b. Quantum-dot – MoS<sub>2</sub> large area heterojunction solar cells.

**Keywords : colloidal quantum dots, 2D materials (graphene, MoS<sub>2</sub>), solar cells, optoelectronics**

**Additional information :****\* Required skills :**

Strong knowledge of semiconductor physics and devices as well as optoelectronics. Very good marks in the undergraduate course curriculum.

Desired but not required: prior expertise with solution-processed devices (spincoating, thermal evaporation etc.) or characterization (I-V, spectral EQE etc.)

**\* Miscellaneous:** Candidates with interest to continue at a Ph.D. level are strongly encouraged to apply and will be seriously considered.

This topic can accommodate more than one candidates.