

Title: **Overview of the synthesis of multinary semiconductor chalcogenide nanomaterials based on wet chemistry techniques**

Student: Lluís Otero de Muller

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Supervisor/s: Dr. Albert Figuerola Silvestre
Departament of Inorganic and Organic Chemistry

The use of semiconductor nanocrystals with quantum properties in energy conversion technologies has attracted a great interest in recent years. The use of ternary or quaternary semiconductors offers a new way to control physical properties by means of chemical composition tuning. Those materials have proved potentially useful in several applications, like increasing the efficiency of light absorption on solar cells, photoluminescence in LEDs or as valuable biomedical resources.

A brief introduction has been made, providing basic knowledge of its fundamental physical properties in the nanoscale, based on the quantum confinement effect. The research community has been investigating new materials with technological breakthroughs, trying to overcome its limitations derived from the use of toxic elements and improving the ways to control their properties.

This work will provide an insight on the most relevant ternary semiconductor chalcogenide nanocrystals, discussing its properties and applications and above all, the different wet chemical techniques used for its preparation. In particular, highlighting the method based on cation exchange, and its benefits on chemical modifications under soft conditions in solution while preserving the nanostructured material size and shape.

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