Master Thesis Project in Nanomaterials

Skills

- Experience working in a laboratory
- Interest in experimental work
- Interest to learn how to operate instruments for characterization
- Teamwork

CONTACT INFORMATION

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Production of Turn-On Sensors Based on 2D-Nanomaterials for Metal Ion Detection

SUMMARY

Nowadays, water contamination with pollutants such as lead, mercury, cadmium, chromium, arsenic, and other heavy metals has become in one of the main worldwide problems due to their high toxicity, but also their carcinogenic and teratogenic properties. Fast and inexpensive strategies must be developed in order to identify and quantify heavy metals even at traces level. Turn-on sensors are a promising strategy for the rapid, reliable, and sensitive detection of analytes in minutes, avoiding highly trained personal, sophisticated instruments settings and time-consuming methods. Here, we aim to develop turn-on sensors based on molybdenum disulphide (MoS_2) where its unique properties at nanoscale dimensions make it suitable for this purpose.

GOALS OF THE PROJECT

- Synthesis of MoS_2
- Functionalization of MoS_2 to tune photoluminescence
- Characterization of the photoluminescence properties of the as-synthetized materials
- Preliminary detection of metal ions in standard samples

DESCRIPTION OF THE PROJECT

Nanomaterials present unique and exotic properties due to their reduced size in the nanometer range. When they interact with the light, different phenomena can occur; photoluminescence is one of them! Photoluminescence is triggered when an incident photon interacts with the nanomaterial provoking that one electron jumps to a higher energy level. When the electron returns to a lower energy state, it emits a photon with a characteristic wavelength. Here, we aim at developing MoS_2 nanomaterials as sensors to detect metal ions. Metal ions can reduce the photoluminescence effect in MoS_2, and so it can be used to monitor the concentration of metal ion in, for example, wastewater.