**Light emission in 2D materials studied by STM-induced luminescence**

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Two-dimensional (2D) materials graphene-like, such as hexagonal boron nitride (h-BN) and semiconducting transition metal dichalcogenides (TMDs), e.g., $MoS_2$, $WS_2$, and $WSe_2$, have been studied extensively in the last years due their great and tunable optical properties [1]. The effect of point defects in the structure of these kind of materials also have been investigated recently due the fact that the optical properties of h-BN as well as of TMDs can be modulated by defect engineering [2]. Point defects confine electronic levels within the band gap of the material, thus point defects lead to stable and robust single photon emitters (SPEs) in h-BN [3], and in the case of TMDs, defect-bound excitons can behave like SPEs [4]. A SPE is a critical element for quantum information [5]. Some works have reported that defects enhance the luminescence of TMDs [6].
In order to understand the structural, electronic and optical properties of individual point defects in 2D materials, we will make to use of a scanning tunneling microscope (STM) accoupled to an efficient light detection system to carry out STM-induced luminescence [7] experiments at low temperature and in ultra-high vacuum. Hence, we will use the STM to obtain images with atomic resolution to identify defects in the structure, measure STS curves to study the electronic properties of defects, and detect the light emitted by the recombination of charge carriers close to defects. As a preliminary characterization of 2D materials, AFM measurements and photoluminescence experiments are being performed to study the morphology and optical activity of h-BN and some TMDs.

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