Correlated TERS, TEPL, & SPM measurements of 2D Materials

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Continuous and large research as well as industrial development have been carried out toward incorporating 2D materials in nanoelectronic devices and thereby in our daily life. With the great challenge of producing large areas of these materials and their integration with other material systems, comes the need of “structural control at the nanoscale”. An information-rich nanocharacterization technique becomes then necessary for further deployment of 2D materials-based applications.

In this talk, I’ll demonstrate how correlated TERS, TEPL & SPM measurements are possible using an AFM-Raman instrument. This means that co-localized information about the topography, the electronic properties and the structural quality can be obtained down to the nanometer scale with a single probe and without sample repositioning. I will present data on MoS2, WSe2, and WS2 as well as on a lateral WS2/WSxSe1-x/WSe2 heterostructure on SiO2/Si substrate. I’ll demonstrate that comprehensive Raman and Photoluminescence characterization at the nanoscale is crucial for understanding the composition and heterogeneities of 2D materials.