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Tip Enhanced Optical Spectroscopy of 2D materials

Raman spectroscopy has become a leading technique in graphene and 2D materials research. It is widely used to determine the number and orientation of layers, the quality of the materials, the presence of defects and their density, and the effects of strain or doping elements. Tip Enhanced Raman Scattering (TERS) is today a mature technique that gives access to all those mentioned information down to the nanoscale, thus providing important insights into the structure of such 2D materials.

In this talk, we'll report results of TEOS (Tip Enhanced Optical Spectroscopy, including TERS and TEPL, Tip Enhanced Photoluminescence) characterization of graphene, functionalized graphene oxide and 2D semiconductors (MoS2, WS2 and WSe2).

We will report on how TEOS characterization can reveal very localized spectra change correlated with the number of layers, the local position of the Fermi level, and breaks of translation symmetry.

We will discuss the impact of TEOS characterization in the studies of single-layer and few layer 2D materials and emphasize the capability of seeing deep-sub-diffraction-limited details that can be today correlated with complementary Kelvin probe microscopy and photo-current techniques.

References

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[3] "The important role of water in growth of monolayer transition metal dichalcogenides" Kastl, Chen, Kuykendall, Darlington, Borys, Krayev, Schuck, Aloni & Schwartzberg, 2D Mater. 4 (2017) 021024.

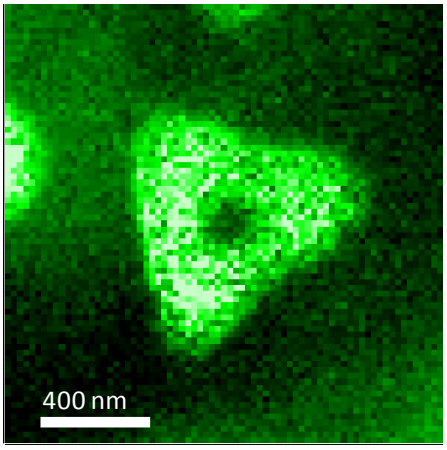

Figure 1: TERS/TEPL image – MoS2 flake on Si