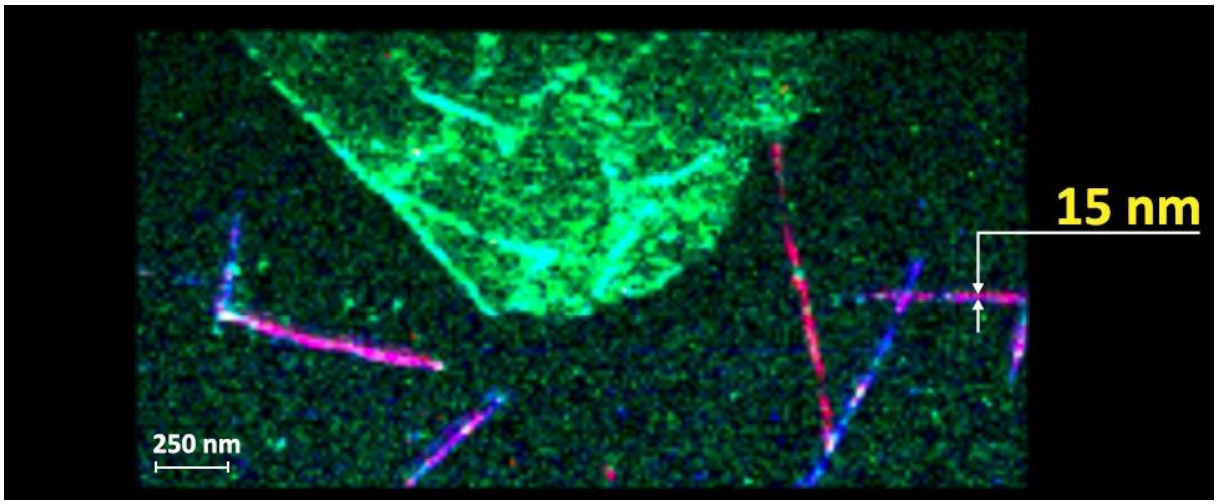
Nanoscale Chemical & Physical imaging of Graphene and other carbon species with nanoRaman

E. Leroy[1], R. Lewandowska[1], O. Lancry[1], J. Schreiber[1], A Krayev[2], S Saunin[2]
HORIBA Scientific[1], Avenue de la Vauve, Passage Jobin Yvon CS 45002, 91120 Palaiseau, France
AIST-NT inc.[2] 359 Bel Marin Keys Blvd, suite 20, Novato, CA 94949, USA
Contact: Emmanuel.leroy@horiba.com

Graphene is a strong Raman scatterer and this technique has long been used to determine quality and number of layers of such material; however it lacks the spatial resolution that is necessary to study engineered structures in detail.
Scanning Probe Microscopy (SPM), and especially Atomic Force Microscopy (AFM) is a powerful technique to image physical properties of graphene, such as topography, conductivity or other electrical properties.
Combining both techniques is challenging but extremely powerful, as it makes imaging of both chemical and physical properties possible, although conventional Raman only provides limited spatial resolution. The step beyond co-localized AFM and Raman is nanoRaman or nano-spectroscopy in general.

In this talk, we will present the latest development in terms of Tip Enhanced Raman spectroscopy (TERS) that make possible nanoscale imaging of chemical and physical properties of graphene and other carbon species: innovative integration of technologies brings high-throughput optics and high-resolution scanning for high-speed imaging without interferences between the techniques. The latest developments in near-field optical probes now provide reliable solutions for academic and industrial researchers alike to easily get started with nanoscale spectroscopy.



TERS (nanoRaman) image of graphene oxide and carbon nanotubes showing 15nm resolution