Organization name: University of Vienna, Austria.

Department/Lab: Group Tailored Hybrid Structures (THS) Faculty of Physics - University of Vienna

http://ths.univie.ac.at

Contact Person at the Host Institution:

Prof. Paola Ayala (Head of THS)
E-mail: paola.ayala@univie.ac.at

Potential STSM candidates will be hosted by THS.

Description of the institution:

The University of Vienna is Austria's biggest in the country. The group Tailored Hybrid Structures (THS) is part of the faculty of Physics of the University of Vienna and it will be the first supervision unit for the STSMs. As faculty of Physics, we are grateful to many great scientists who did research here to form and change the face of our modern world. THS´s long term research covers the synthesis of functionalized carbon nanotubes, post synthesis treatments using nanochemical reactions and the detailed spectroscopic analysis of their electronic and optical properties. THS is part of a larger group with strong focus on spectroscopy: the group Electronic Properties of Materials (EPM). It is one of the world-leading teams in the spectroscopic analysis of the electronic and optical properties of functionalized low dimensional carbon nanostructures. EPM is embedded in the focused-research-area on Complex Nanoscale Matter at the Faculty of Physics of the University of Vienna.

Research infrastructure:

ScientaRS4000 PES system: ARPES, XPS with in-situ preparation chambers. Labram Raman Horiba Spectrometer with a tunable laser. Optical Absorption and Photoluminescence Spectrometers. Bruker Vertex 80V Raman FTIR spectrometer. Flourescence Microscope Horiba DeltaMyc with pulsed laser and detection optimized for life time fluorescence. The available excitation wavelengths are optimized to excite the second optical transition in SWCNTs and detect the fluorescence in different ranges. Flexibility for other types of materials. RHK UHV 700 VT scanning probe microscope with optical access to the sample, easily locked for the multiple characterizations expected within the project. A Flourescence spectrometer Horiba Flourolog with NIR and Vis detection. A triple monochromator Raman spectrometer providing continuous wavelength-tuning from 420-900nm including several purpose-built setups for in-situ spectroscopy.

Five representative publications

- *Exclusive Substitutional Nitrogen Doping on Graphene Decoupled from an Insulating Substrate* J.C.Moreno, F.Fedi, G.Argentero, M.Carini, J.Chimborazo, J.Meyer, T.Pichler, A.Mateo, P. Ayala, **J. Phys. Chem. C** 124 (**2020**) 22150
- *Reversible changes in the elect. struct. of CNT-hybrids upon NO2 exposure @ amb. conditions* F. Fedi, O. Domanov, H. Shiozawa, K. Yanagi, P. Lacovig, S. Lizzit, S. Goldoni, T. Pichler, P.Ayala, **J. Mater. Chem. A** 8(**2020**)9753
- *Revealing the adsorption mechanisms of NOx on ultrapure, metallicity-sorted CNT.* G.Ruiz-Soria, A.Perez, M.Sauer, D.Mowbray,P.Lacovig, M.Dalmiglio,S.Lizzit, K.Yanagi, A.Rubio, A.Goldoni, P.Ayala, T.Pichler **ACS Nano** 8(**2014**)1375
- *The physical and chemical properties of heteronanotubes,* P Ayala*, R Arenal, A Loiseau, A Rubio, T Pichler **Rev. Mod. Physics** 82 (**2010**) 1843. *Confined linear carbon chains as a route to bulk carbyne*
- L.Shi, P.Rohringer, K.Suenaga, Y.Niimi, J.Kotakoski, J.C.Meyer, H.Peterlik, M.Wanko, S.Cahangirov, A. Rubio, Z.J. Lapin, L. Novotny, P. Ayala, T. Pichler, **Nature Materials** 15, (2016) 634

Interests Regarding Hosting STSMs:

In situ and operando experiments for gas sensing. Optical Spectroscopy characterization of carbon nanostructures and other materials. Mainly Raman and Optical Absorption Spectroscopy. Scanning tunnelling microscopy facility (no training available but possibility to use the microscope, LEED and AFM functions for extended periods of time). Fluorescence Microscopy with life time microscopy and spectroscopy with various excitation wavelengths and various detection ranges. Detection with ps capability in the IR, UV and visible. XPS characterization. UPS capability and LEED in-situ. Photoemission spectrometer optimized for ARPES.