Ultrafast, automated and high-resolution confocal Raman imaging and
Cameras and spectrographs for modular spectroscopy and imaging

LOT-QuantumDesign (formerly L.O.T-Oriel) has been one of the leading European distributors of high-tech instrumentation and consumables for scientific, academic and industrial research for over 45 years. Our product range comprises scientific light sources and optics, components, and systems for the life sciences, material characterization, cryotechnology, spectroscopy and imaging.

We kindly invite you to participate in our Workshop presenting confocal Raman microscopes and modular solutions for spectroscopy and imaging on Sunday, September 3rd at 3 pm.

Speakers: Kamila Banasik (WNoZ US, Sosnowiec), Mateusz Dulski (SMCEBI, Chorzów), Markus Krause (LOT-QuantumDesign), Maxime Tchaya (WITec).

Schedule:

3.00 pm Agnieszka Kowalczyk (LOT-QuantumDesign): Introduction

3.15-3.45 pm Dr. Mateusz Dulski: Application of Confocal Raman Microscopy: organic and inorganic materials characterization

Confocal Raman microscopy has lately become more and more useful in the characterization of various types of materials. A typical application field is the analysis of the organic polymer distribution (cellulose, hemicellulose, lignin etc.) within plant cell walls. 3D confocal Raman imaging helps determine the spatial distribution of different organic polymers in the analyzed material. It also allows the determination of molecular arrangements, for example spatial ordering and crystallinity of cellulose chains, through polarization studies. Such studies offer important information on various mechanisms linked to plant growth.

Another application field is the analysis of the crystal structure of inorganic materials such as minerals, composites and nanoparticles. CRM provides information on the degree of crystallinity of the material, structural modifications caused by the introduction of external modifiers or the impact of temperature on the crystal structure. 3D confocal Raman imaging allows the analysis of the structural defect distribution and the determination of chemically different phases. These analyses may be realized both in focal plane and throughout the entire sample material.

3.45-4.15 pm Dr. Kamila Banasik: Raman spectroscopy in the study of geological samples

Raman spectroscopy is used in various geological application fields like geochemistry, mineralogy, petrography, paleontology and more. The research conducted at the Raman Spectroscopy Laboratory of the Faculty of Earth Sciences of the University of Silesia primarily covers the analysis of inorganic phases with varying degrees of crystallinity and the investigation of organic phases associated with the formation of fossil fuels. The lab is part of the University’s Laboratories of Atmospheric Controlling and performs research related to the characteristics of widely understood atmospheric dusts.

The presentation includes a short description of the study and the influence of the instrumentation parameters, a presentation of the results of selected spectroscopic analyses (for example spectra of dark and metallic minerals, isomorphic solid solutions, new mineral phases, or organic substances with varying degrees of crystallinity and carbonation), and a brief outline of the methodological and analytical problems most commonly encountered when working with rock materials.

4.15 -4.30 pm Break

4.30 -5.15 pm Dr. Maxime Tchaya: Ultrafast, automated and high-resolution confocal Raman imaging

Confocal Raman microscopy (CRM) is a high-resolution imaging technique widely used for the characterization of materials and specimens in terms of their chemical composition. Chemical properties of solid and liquid components can be analyzed with
diffraction-limited spatial resolution (λ/2 of the excitation wavelength). Neither labeling nor other sample preparation techniques are necessary. Raman images clearly illustrate information regarding the sample’s chemical compounds and their distribution within the sample. The WiTec Raman microscopes and imaging systems combine an extremely sensitive confocal microscope with an ultrahigh-throughput spectroscopy system for unprecedented chemical sensitivity. Their outstanding performance in speed, sensitivity and resolution can be jointly applied without compromises.

5.15-6.00 pm  Markus Krause: **New cameras and spectrographs for modular spectroscopy and imaging**

We will present highly sensitive, scientific imaging and spectroscopy cameras based on CCD, EMCCD or sCMOS sensors from market leader Andor Technology. These cameras are used in many different applications ranging from fundamental physics (Bose-Einstein condensates (BEC), single-ion and molecule detection) to astronomy (adaptive optics, lucky and speckle imaging), Raman imaging, fluorescence and luminescence imaging, and microscopy-based techniques like TIRF, super-resolution and fluorescence microscopy. All systems feature highest sensitivity in the UV, visible and NIR range. Thermo-electric cooling and high-quality AD converters reduce noise to allow applications even under the most extreme low light conditions.

6.00 pm  Summary and closing

**For more information please contact Agnieszka Kowalczyk kowalczyk@lot-qd.pl.**