Raman & nanoraman spectroscopy: innovative sample scanning methods, artificial intelligence chemometrics, image microgeoprocessing and colocalized measurements with scanning electron microscopy and x-ray microfluorescence

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This presentation will focus on Raman and NanoRaman applied to the most diverse branches of knowledge. In this presentation you will learn the basic principles of Raman spectroscopy applied to Raman imaging. Applications and instrumentation will be the main topics for a wide range of materials characterization, including polymers, ceramics, biomaterials, life sciences and two-dimensional (2D) materials. Raman and Nanoraman microscopy is one of the only techniques capable of providing non-destructive, accurate analysis combined with high resolution images. Raman spectroscopy provides valuable information about the studied sample, such as chemical and structural composition. Based on the light-matter interaction, we obtain relevant information, such as: particle distribution, homogeneity, grain size, phase changes and several other characteristics of the sample through the chemical evaluation of the material. We will also discuss the combination of laser-excited photoluminescence imaging and Raman scattering of two-dimensional (2D) crystals to reveal the solid-state structure. The development of instrumentation makes possible the hyphenation of Raman with other techniques, such as Photoluminescence and AFM, being able to reach resolutions on a nanometric scale. The technique can be applied in several areas of knowledge, such as pharmaceuticals, photovoltaics, graphene, cells, nanoparticles, microplastics, among others.