Use of SNOM for analysis of biomarker molecules when excited by Raman

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Abstract: During the last decade, many studies have made significant progress in understanding the causes and implications of our environment, with respect to the atmosphere. Bioaerosols are fundamental in the reproduction of plants and microorganisms (pollen, spores, etc.), which in the atmosphere are transported across borders and long distances. For this reason, bioaerosols have great importance in genetic diffusion between habitats and biomas geographic change, contributing as main elements in the development, evolution and ecosystems dynamics. The consequences related to public health and agriculture are associated by the dispersion of plants, animals, pathogens and human allergens, showed an increase of allergies and asthma cases during storms, due to high concentrations of bioaerosols, especially when attributed to fungal spores. The biological content found in the air of global land surfaces corresponds to a quarter of the total particles found in the air, consisting mainly of proteins, arising from pollens, fungal spores, bacteria, viruses or fragments of plant or animal matter. Some proteins act as marker molecules which autofluoresce if excited at a specific wavelength. A signature of biomarker proteins, existing in the cell wall of fungal spores of medical interest, will be developed using scanning near-field optical microscopy (SNOM). This new high resolution optical methodology will allow detailed analysis of biomarker molecules (ergosterol, mannitol and arabitol), as well as their behavior when excited by Raman. In possession of a molecular standard, a database of these characteristics will be created, which will provide technical support for the remote Raman sensing of these species in the atmosphere of the Metropolitan Region of São Paulo (MRSP).

Keywords: SNOM; Bioaerosol; Raman.

XI WLMLA Topic: Remote sensing of tropospheric aerosols

ID: Poster 120