

## **From nano-medicine to nano-optics of quantum materials: the multidisciplinary analytical power of synchrotron nano-IR**

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Few year ago, the use of infrared (IR) radiation from storage rings has brought unprecedented opportunities in label-free chemical analysis of materials. Such breakthrough was intrinsically connected to the higher brightness of the synchrotron IR compared to the classic back body thermal sources. Hence, the era of IR microscopy had started, and synchrotron facilities were meeting points for advanced spatial-spectral chemical imaging. In the last decade, the interest in sub-microscopic properties of the matter became a day-by-day demand and the classical diffraction limit of light prevented IR microscopy to follow those updates.

In this presentation, the ultramicroscopy modality named synchrotron IR nanospectroscopy (SINS) is presented as an established analytical technique able to access complex optical and vibrational properties of multidisciplinary materials at the nanoscale. In special, it will be presented the advances brought by this modality to the IR users' program at the LNLS. Drug delivery, new energy materials, in-liquid nano-chemistry of biosystems and nano-optics of quantum materials are some of cases to be approached in this talk.