

Time TBA

## **Synchrotron Infrared Micro-spectroscopy: where are we?**

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Synchrotron radiation is an extremely bright source of light, which has been traditionally exploited in the energy range extending studies between the hard X-rays to the VUV. However, during the last two decades, infrared spectroscopy and micro-spectroscopy became thoroughly exploited. Nowadays, almost all synchrotron facilities worldwide, has an operational, under construction or planned beamline. The synchrotron infrared emission exceeds the thermal source in both flux and brightness terms, in the far-IR region ( THz) while , despite of a lower flux emission in the mid-IR, the brightness advantage remains greater by a factor of two to three orders of magnitude in this frequency domain. Infrared microscopy at synchrotron facilities has expanded fastly, due the the increasing demand of study at the diffraction limited spot size. The success of such micro-analytical technique relies on its multidisciplinary exploitation.

The science program of existing IR beamlines is often dominated by biological and biomedical applications. They have attracted most of the interest among this specific scientific community, probably because of the diagnostic potential of the technique, when probing biological sample at sub-cellular resolution. Several examples will be shown to illustrate the actual potential in cancerous cells, drug treatment, resistance biomarkers, human tissue diseases .

Infrared micro-spectroscopy beamlines are now facing an increasing demand of beamtime from other disciplines : Plant Biology, Earth Science, Environmental science, Cultural Heritage and Archaeology, Astrophysics and Soft matter. Accordingly, this has contributed to the increase of infrared microscopy beamlines worldwide. Recent beamlines exploit both the infrared emission from edge radiation and bending magnet, and often, this has been used to set up two infrared branches from the same extraction. I will present the recently operational beamlines, and also provides an update of the ones under design, or construction. Due to the success of multidimensional infrared detectors for infrared imaging, several beamlines are equipped with array detectors or FPA-based microscopes. I will provide an update of the use of such detectors in synchrotron facilities.