

5th Italy-Australia Workshop:

“Synchrotron Radiation X-Ray Imaging for Life Sciences & Cultural Heritage”

Synchrotron Radiation InfraRed MicroSpectroscopy (SR-IRMS) for life sciences at SISSI beamline

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Infrared Microspectroscopy (IRMS) is nowadays a well-established analytical technique for the investigation of a huge variety of samples, allowing the correlation of sample morphological details with its vibrational local pattern. IRMS, a label free, non-destructive and highly sensitive technique, is specially suitable for biochemical characterization of biological specimens: drug screening, disease diagnosis, biopsies. These are just few examples of life science applications of this technique.

The improvement of the biomedical capabilities of IRMS would benefit from i- pushing the lateral resolution of IRMS to, and possibly beyond, its physical limits, ii- performing measurements of living cells/hydrated tissue slides under physiological conditions, iii- making IRMS of cellular samples a semi-quantitative technique.

The brilliance advantage of Synchrotron Radiation (SR) guarantees the possibility to achieve a diffraction-limited spatial resolution while near-field infrared microspectroscopic approaches with nanometric resolution have been developed over the past years and are becoming more popular day by day.

The life sciences branch of SISSI@Elettra (Synchrotron Infrared Source for Spectroscopy and Imaging) devoted a special attention to the development of strategies for both living cell and semi-quantitative SR-IRMS.

The last results in the microfabrication of fluidic devices for living cell analysis will be presented. Several experiments done at SISSI will be exploited for highlighting the advantages offered by the proposed approach and the benefit for life sciences.

The results obtained by the combination of infrared and atomic force microscopies for making IRMS a semi-quantitative technique will be also shown in order to achieve a better understanding of the cellular biochemistry.