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Radioactive matter investigations at the MARS beamline of synchrotron SOLEIL

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The Multi-Analyses on Radioactive Samples (MARS) beamline at the French synchrotron SOLEIL is opened to the international community since 2010. This beamline is fully devoted to advanced structural and chemical characterizations of radioactive matter (solid or liquid), coupling analytical tools such as X-ray absorption spectroscopy, X-ray diffraction and X-ray fluorescence.

Since September 2013, analyses on radioactive samples at ambient temperature and pressure with activities up to 20 000 times above the French exemption limit are now allowed (thus for actinides up to activities of 200 MBq). Yet, the final aim is to get an extension of the possibilities of analyses onto a larger variety of experiments and to activities up to 18.5 GBq.

Currently, six different types of experiments are available: standard X-ray absorption spectroscopy (XAS), High-Resolution X-ray absorption spectroscopy (HRXAS), Transmission X-ray diffraction (TXRD), High-Resolution X-ray diffraction (HRXRD), Wide-Angle X-ray Scattering (WAXS) and associated X-ray microbeam techniques (μ XRF/ μ XRD/ μ XAS).

In this contribution we will describe the progresses that have been made on the beamline in the last years and we will give a brief overview of experiments on a selection of topics related to the nuclear or radiochemical field.

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