

# High energy resolution fourteen-crystal spectrometer for high quality fluorescence and absorption measurements on an X-ray Absorption Spectroscopy beamline

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FAME (French Absorption beamline for Material and Environmental sciences) and FAME-UHD (FAME-Ultra High Dilution) are two French CRG beamlines at ESRF dedicated to X-ray Absorption Spectroscopy (XAS) in material science, catalysis and especially in environmental and Earth sciences. The study of the speciation of highly-diluted elements by XAS is experimentally extremely challenging. On the FAME beamline, we developed a CAS in the Johann's geometry, using 1 [1] and 5 crystals [2]. This 5-crystal spectrometer was installed on a dedicated beamline (FAME-UHD), opened to regular users since January 2017. Beginning of 2018 a 14-crystal spectrometer was then installed (Figure 1). Within this approach, measuring the XAS signal in fluorescence mode is performed with a  $\approx 1$  eV energy resolution, for photons energy ranging from 4 to 18 keV. Due to this new tool many restrictions on sample concentrations and multi-fluorescence interferences may be overcome [3]. XAS measurements on a target element down to 1ppm and even below are now possible [4,5], as well as *operando* and *in situ* measurements [6,7].



Figure 1: 14-crystal Crystal Analyzer Spectrometer on FAME-UHD beamline.

## References

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