

THE ID18F MICROPROBE ENDSTATION AT THE EUROPEAN SYNCHROTRON RADIATION FACILITY (ESRF)

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The ID18F new microprobe end-station at the ESRF is dedicated to quantitative micro X-ray fluorescence experiments. The end-station is situated in the third experimental hutch of the ID18 nuclear resonance beamline and uses its three undulators and optics hutch (a high heat-load Si(111) double crystal monochromator) for creating the excitation beam in the 6-9 keV, 14.4 keV and 21.5-27 keV energy ranges.

The micro beam is obtained by using different focusing devices, such as Fresnel zone plate (FZP) for energies below 15 keV and compound refractive lenses (CRL) in the E>15 keV energy range. The typical achievable beam-size is between 0.5 and 4 μm in the vertical and between 3 and 15 μm in the horizontal directions, depending on the focusing element being used.

One of the most important requirements at the new beam-line is the precise and reproducible quantification in the ppm level with <10% accuracy for elements with atomic numbers above K. In order to fulfill these requirements the effects influencing the stability and detection limit should be investigated. The intensity (and degree of polarization) of the analyzing micro beam is sensitive to the intensity and position of the source (i.e., the electron beam position in the storage ring), the stability of the double crystal monochromator, and the alignment of the applied focusing device. The various effects contributing to the intensity variation of the focused beam were investigated. The monitoring of the intensity of the excitation beam for normalization purposes is obtained by using a miniature ionization chamber detector developed for the ID18F beamline.
