µFOCUS 450

THE MOST VERSATILE X-RAY SOURCE
FOR CUTTING EDGE XPS, HAXPES AND NAP-XPS

KEY FEATURES

- Multiple photon energies at 1487 eV and 2984 eV
- Chromium extension for HAXPES at 5414 eV
- Variable spot size from <100 µm to >1000 µm
- Ultimate photon flux densities
- Full software control

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Multi Wavelength Excitation

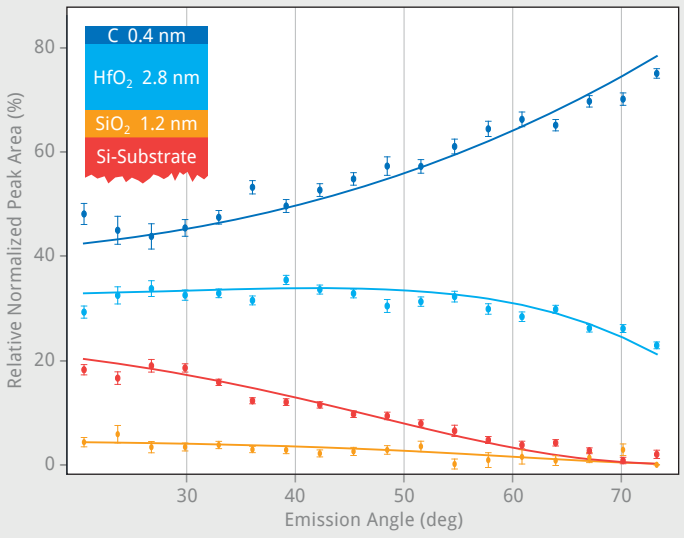
The µFOCUS 450 is a most versatile small-spot multi-wavelength X-ray monochromator for surface analysis and depth profiling applications. This fully computer controlled device allows for in situ switching between different emitters for Al, Ag and Cr excitation, thus providing X-rays with high flux density for various application such as small, medium and high energy XPS and surface layer thickness characterization.

Design

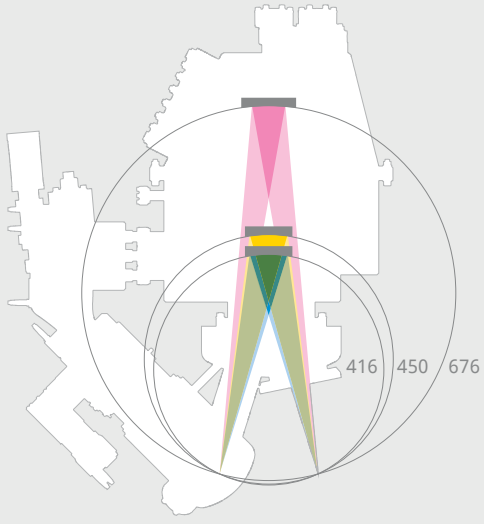
The new monochromator is an all in one solution for XPS and HAXPES systems, without the space consuming solutions of several individual light sources. It combines the performance of the µFOCUS 500/600, for Al with 1487 eV and Ag with 2984 eV excitation, and the µFOCUS 730, for Cr with 5414 eV excitation. The new design hosts up to three anodes and the corresponding monochromator optics in one Rowland Circle based housing. Switching between the anodes and the optics is fully computer controlled. The chromium extension is hereby an additional addon to the base version. With a variable spot size of less than 100 µm to more than 1 mm, this X-ray source fits most requirements, starting with small spot (and NAP) hemispherical analyzers to large or X-ray sensitive samples. A special NAP extension for operation at elevated pressures is available and ideally fits the new AEOLOS 150 NAP analyzer.

Laboratory XPS, HAXPES and NAP XPS

A reliable and functional X-ray source is the key to any photo electron spectrometer, as the best analyzer cant perform without a strong partner. The µFOCUS 450 is the solution for modern laboratories, either dedicated to complex and custom surface analysis, high energy excitation studies, modern material analysis under ambient conditions – or even all in one system. Its modularity allows the user to choose the correct configuration without compromising performance or future upgrades.



Two layer thin film on Si-wafer, depth profile gate oxide



Monochromator layout with the Rowland Circle; in mm

Depth Profiling

Non destructive analysis of layer thickness requires high energy excitation to overcome the inelastic mean free path and emit electrons from deeper layers for analysis. On the other hand, lower cross section and thus count rate reduce the efficiency of the overall experiment. Combining several excitation lines, from low to high energy, give a comprehensive and reliable result, which can efficiently be used for layer thickness analysis. Well focusing of the source enhances the flux density and hence, compensates the reduced efficiency.

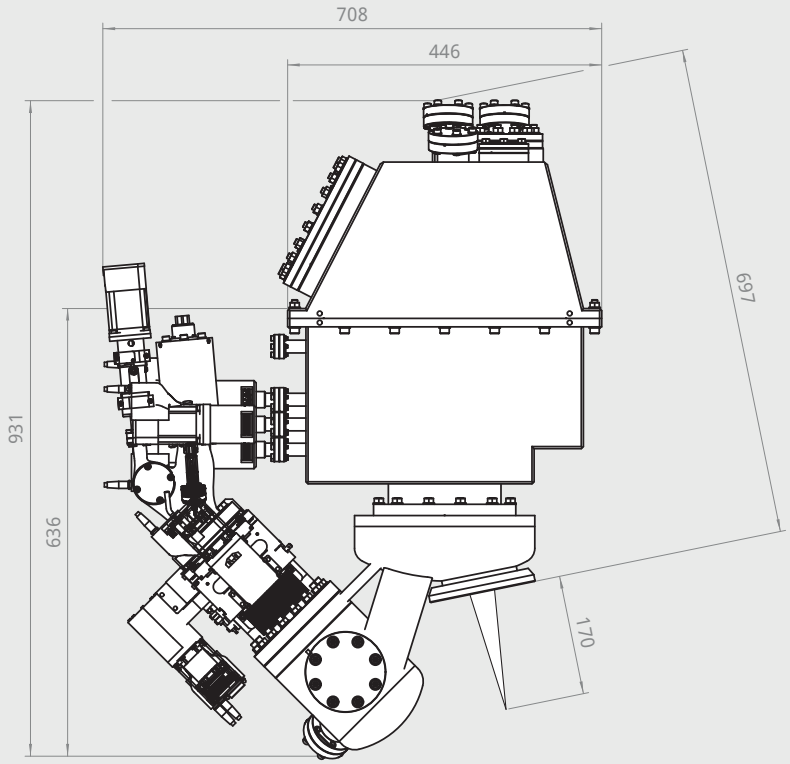
NAP XPS

Due to signal absorption in the surrounding gas, NAP XPS is on of the most challenging applications in surface analysis. High performance analyzers, such as the AEOLOS 150 NAP, require a matched X-ray source, fitting the small analyzer field of view and the need for a high flux density on smallest spots. The µFOCUS 450 is designed to cover these requirements for highly efficient NAP XPS measurements.

Technical Data

Specification	Al K_α	Ag L_α	Cr K_α
Photon Energy	1487 eV	2984 eV	5414 eV
Minumum Spot Size	< 100 µm	< 100 µm	< 100 µm
Maximum Spot Size	> 1000 µm	> 1000 µm	> 1000 µm
Maximum Power	400 W	400 W	400 W (30 kV)
Max Flux (Ph/(s×mm^2))	1.9×10^{10}	1.2×10^9	1.9×10^{10}
X-ray Line width (FWHM)	< 220 meV	< 450 meV	< 500 meV
Rowland Circle	450 mm	416 mm	676 mm

Dimensions



µFOCUS with chromium extension; dimensions in mm

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