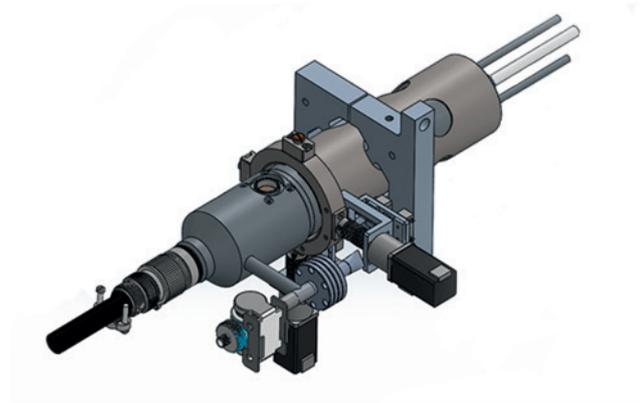


# FAAST Microfocus X-ray source



## Benefits at a glance

- Multiple (up to 5) characteristic energies (e.g. Cr, Cu, Mo) for selection of optimal X-ray spectrum
- Rapid, push-button selection of X-ray energy
- Ultrahigh brightness of  $>10^{10}$  X-rays/s/mm<sup>2</sup>/mrad<sup>2</sup>
- Adjustable focal spot size from 15 to 40  $\mu\text{m}$
- Stable source spot position when changing between targets and/or adjusting focal spot size
- Dual output windows to enable two beams
- Low maintenance (no need for periodic maintenance)
- Option to bundle with Sigray's proprietary high-efficiency focusing or collimating optics

## Unique combination of ultra-high brightness with user-selectability of multiple X-ray energies in a single source

The Sigray FAAST (Fine Array Anode Source Technology) X-ray source is a revolutionary new X-ray source, offering unprecedented performance previously unavailable in laboratory X-ray sources. FAAST is one of the world's brightest laboratory X-ray sources with the powerful and unique capability of multi-energy acquisition through push-button selection of multiple X-ray target materials, each of which produces its own characteristic spectrum.

Key specifications	
Parameter	Specification
Target materials	Standard (dual targets): Cu and Mo other targets (e.g. Cr, Rh, W, Fe, etc) upon request. Up to 4 targets can be selected.
Substrate material	Diamond
Power	0 - 100 W
Voltage	20 - 50 kV
Maximum current	4 mA

Additional specifications	
Parameter	Specification
Minimum focal spot	$\sim 15\mu\text{m}$
Focal spot to window	30 mm
Focal spot stability	$< 1\mu\text{m}$
Cone beam angle	$\sim 15^\circ$
X-ray window material	Beryllium

Performance examples	
Spot size*	Electron beam power
15 $\mu\text{m}$	SOW
40 $\mu\text{m}$	100 W

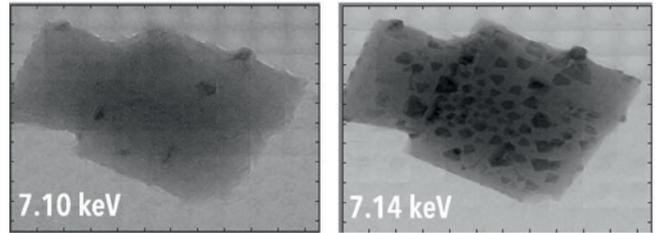
\* Apparent spot size viewed from window (not electron beam footprint on target). Given as FWHM.

Performance examples		
Target material	Energy k	Peak brightness @ k-line
Cr	5.4keV	$2.4 \times 10^{10}$ ph/s/mm <sup>2</sup> /mrad <sup>2</sup>
Cu	8keV	$2.6 \times 10^{10}$ ph/s/mm <sup>2</sup> /mrad <sup>2</sup>
Mo	17.4keV	$1.7 \times 10^{10}$ ph/s/mm <sup>2</sup> /mrad <sup>2</sup>

# FAAST Microfocus X-ray source

## Multi-target advantages: X-ray energy selection

The energy tunability achieves benefits previously only available at synchrotron sources. This enables: in XRF: maximizing fluorescence signal or suppressing background, in imaging: differential absorption contrast and optimizing contrast, and in XRD/SAXS: optimizing scattering cross-sections.



Example of the impact of X-ray energy on contrast, demonstrating the importance of multiple X-ray targets. Courtesy P. Pianetta, S. Brennan on Xradia nanoXCT-S100 at Stanford Synchrotron (SIAC).

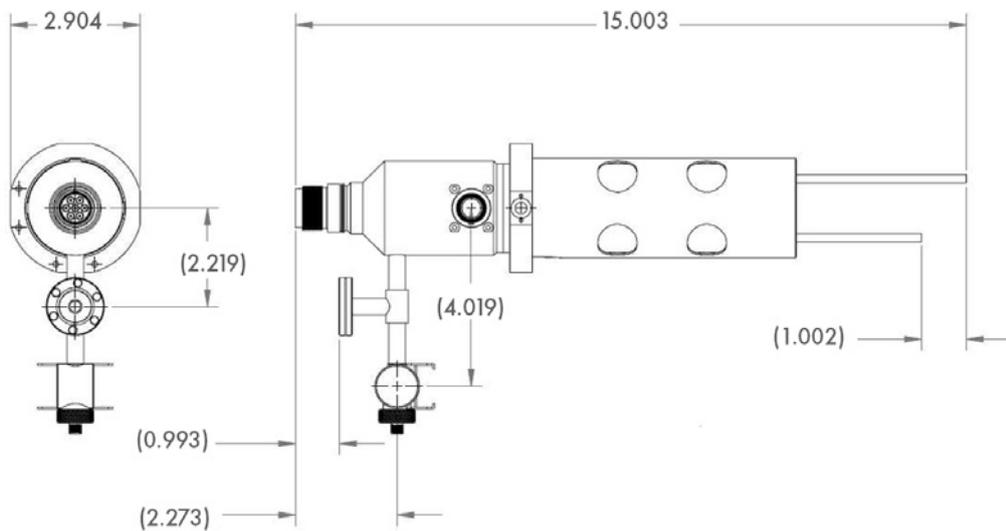
## Dimensions & ratings

Source dimensions: 13.5" x 3" x 5.5"

Source is controlled remotely through software. Additional external accessories include an ion pump controller (dim. 5.6" x 3.5" x 9.9") and a chiller (13" x 11" x 13").

Electrical requirements: 115 V AC, 60 Hz

Operation: Suggested temperature 20-25 °C, max 85% relative humidity



Advantage of multiple X-ray excitation energies in XRF

Element of interest	Cr target, 5.4 keV	Cu target, 8 keV	Mo target, 17.4 keV
S	1017	338	35
Ti	2812	321	321
Fe	0	7696	941
Se	0	0	4052