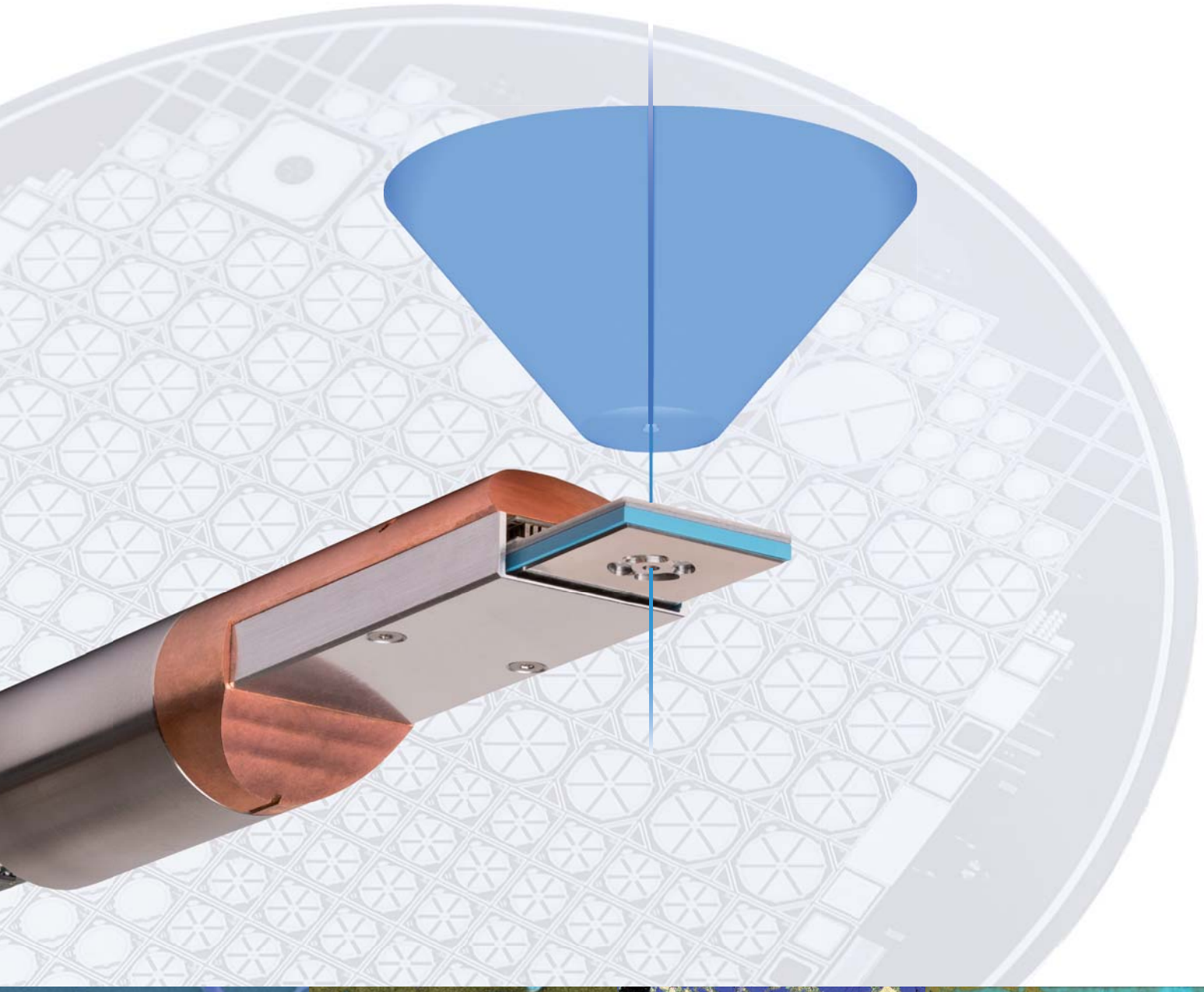
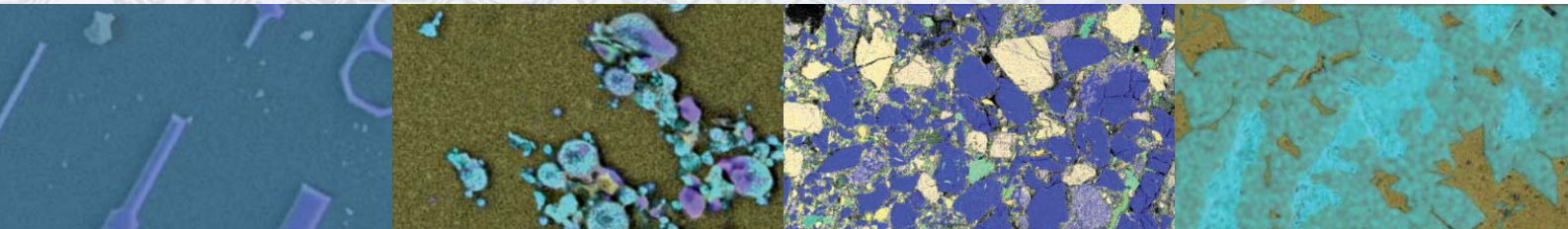
PNDetector

THE ROCOCO PREAMPLIFIER MODULE

ULTRA HIGH SOLID ANGLE X-RAY DETECTOR FOR SEM, TEM AND XRF





PND's Rococo Preamplifier Module

Silicon Drift Detectors (SDD) are commonly used for X-ray spectroscopy. With the integrated transistor and the accompanying low detector capacitance, SDDs made by PNDetector achieve the best energy resolution on the market. Multiple SDDs are often a simple but space consuming way to increase the solid angle coverage and thus the overall count rate. A smarter high solid angle solution is offered by the Rococo Preamplifier Module.

The Rococo Preamplifier Module is an SDD-based system for X-ray spectroscopy featuring our annular four channel Rococo SDD. An optimized detector geometry allows it to be placed directly into the beam axis. This enables a close proximity to the sample, which results in a huge solid angle coverage and a high takeoff angle. The compact preamplifier and supply electronics ensures the best resolution and easy integration into every system and handles very high count rates up to 4 Mcps.

Choose the detector that fits your needs

Rococo 2

- active area of 4 x 15 mm²
- central hole of 1.8 mm
- 1.1 sr solid angle coverage
- typ. 126 eV FWHM @ Mn-K_α (10 kcps)
- typ. 128 eV FWHM @ Mn-K_α (100 kcps)
- P/B ratio of 15 000

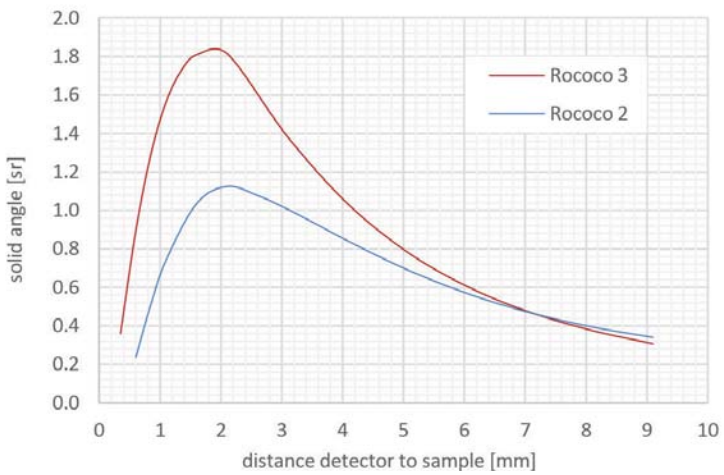
Rococo 3

- active area of 4 x 20 mm²
- central hole of 1 mm
- 1.8 sr solid angle coverage
- typ. 126 eV FWHM @ Mn-K_α (10 kcps)
- typ. 128 eV FWHM @ Mn-K_α (100 kcps)
- P/B ratio of 15 000

Ultra large solid angle

With its four annular arranged cells, the Rococo detector achieves a very high solid angle of up to 1.8 sr. This is made possible by the central hole which allows the detector to be brought in very close proximity to the sample without obstructing the exciting beam. A Mylar or Beryllium foil shields the detector against electrons and particles.

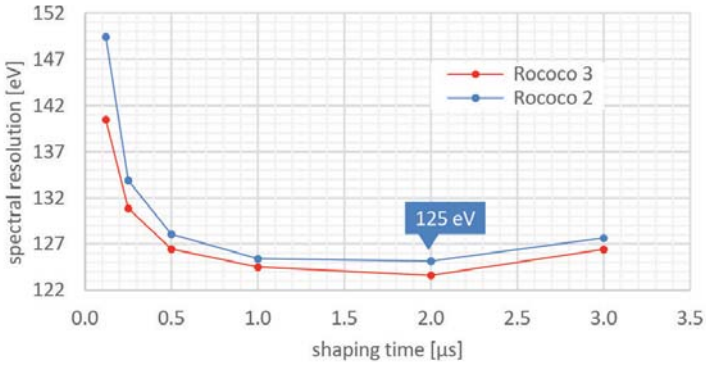
The graphic shows a simulation of the solid angle in relation to detector-sample-distance. For both detectors the collimator was optimized for a sample distance of 2 mm which corresponds to a working distance of est. 6 mm. Even for a sample distance of up to 4 mm the detector still covers a large solid angle of about 1 sr.



Excellent spectroscopic performance

With the internal FET, the Rococo detector minimizes noise and parasitic capacitance and therefore reaches a spectral resolution of 125 eV FWHM @ Mn-K_α. Light elements down to Carbon can be detected depending on the chosen filter foil.

The graphic shows the spectral resolution in relation to the shaping time. It displays the average FWHM resolution of all four channels at Mn-K_α with a count rate of 20 kcps and a chip temperature of -30 °C. Both detectors reach an excellent spectral resolution of 125 eV FWHM.



A vast variety of applications

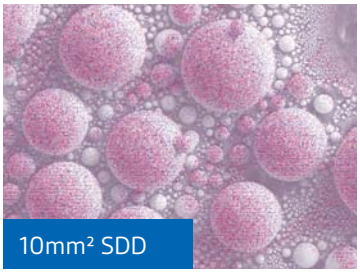
Whenever there is a need for fast measurements combined with low exciting beam flux, the Rococo preamplifier module gives you a considerable advantage over commonly used X-Ray detectors. With its large solid angle the Rococo detector produces up to 200 times more signal then a conventional SDD. The high takeoff angle, as well as the annular arrangement, nearly eliminates shadowing even for rough samples.

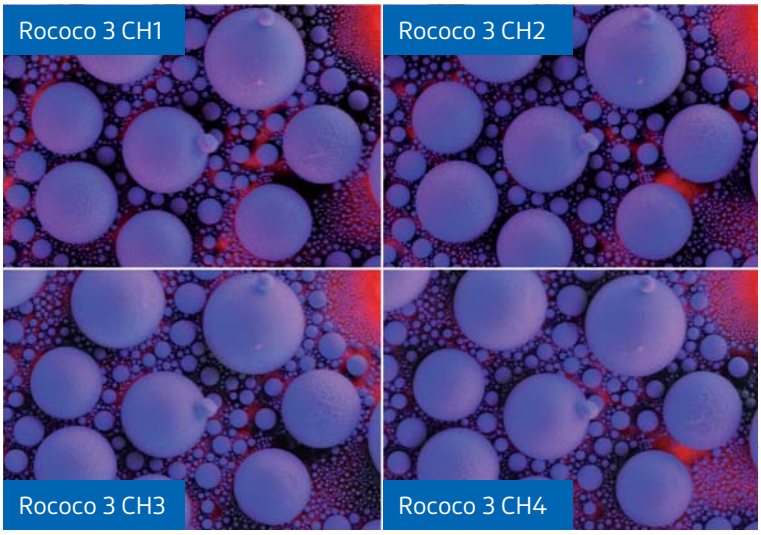
High resolution SEM-EDX mappings (1024 x 768 px) of a Tin (blue) on Carbon (red) sample.

Measurements performed at 77 pA beam current, 10 kV beam energy and 60 min acquisition time:

Rococo 3 Detector, 1.8 sr solid angle

Conventional 10 mm² SDD, 0.01 sr solid angle

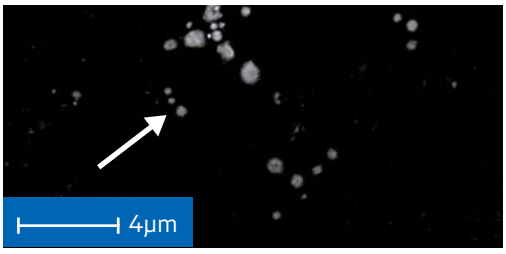


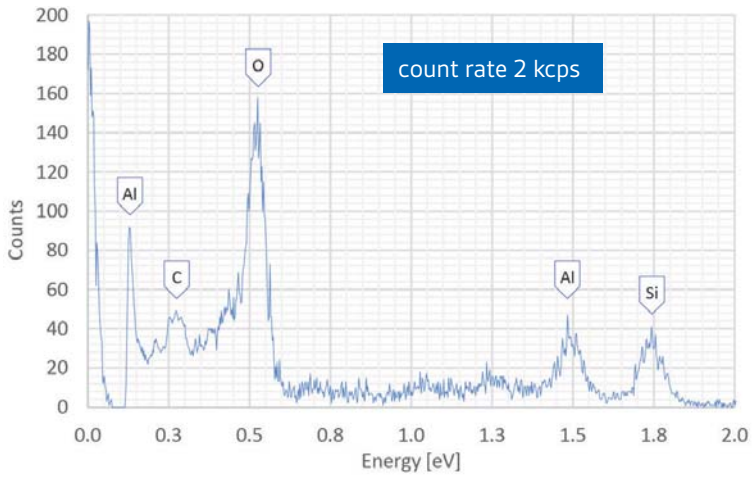


Particle analysis of a fly ash sample with the Rococo 3 detector.

The measurement was performed in an SEM with an acquisition time of 10 s, a primary beam energy of 10 kV and a beam current 77 pA:

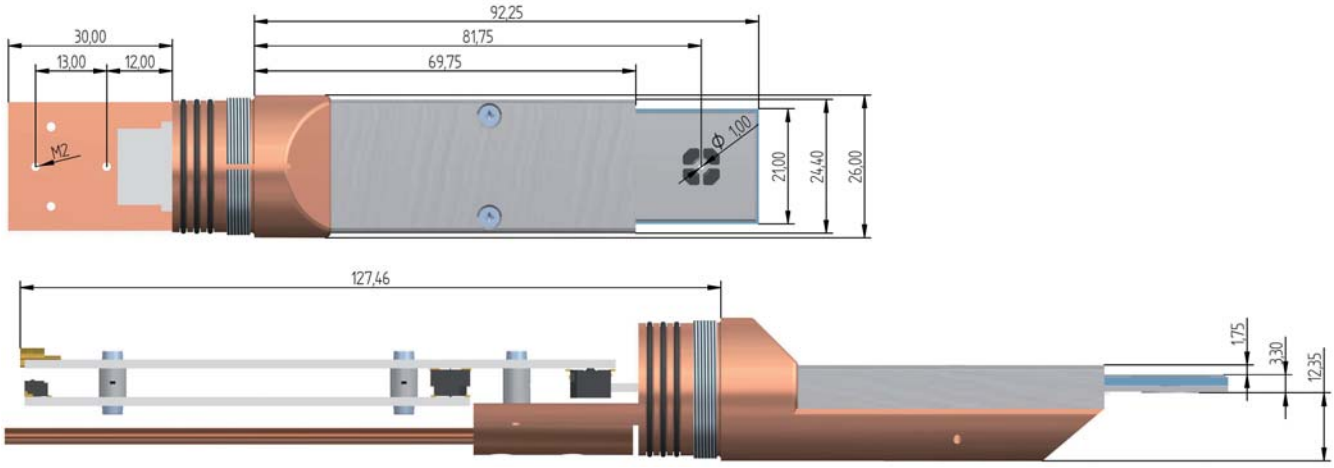
The diameter of the measured particle is 0.8 µm





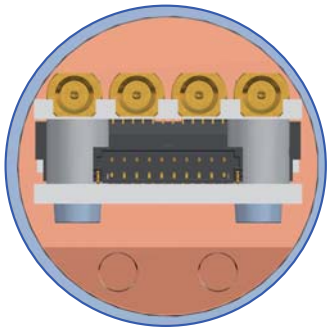
Mechanical dimensions

There are two options to mount the Rococo preamplifier module. The first option is mounting it inside a 26 mm tube. In that case, the detector can be retracted through a linear feedthrough. A compatible water cooling is available for that option. The second option is mounting it to a flat heatsink inside the vacuum via two M2 screws. For that option, the heatsink must be capable to handle a heat load of 6 watts.



Electrical connections

The detector electronics are supplied with only four supply voltages and a TTL reset pulse. The actual bias voltages for the detector are preconfigured by PNDetector and generated by the supply electronics. The output signals of each channel are pre-amplified separately and can be connected via four micro coaxial connectors. The output signal is then 10 mV/keV. To monitor the chip temperature, the diode voltage of an integrated temperature diode is also preamplified and delivers a signal of 30 mV/K.



Input

- -180 V Supply Voltage
- -9 V Supply Voltage
- +9 V Supply Voltage
- TTL Reset Pulse
- TEC Supply Voltage (max. 8 V and 0.9 A)

Output

- 4x Coaxial Signal Output (10 mV/keV)
- Temperature Diode Voltage (0.03 V/K)

Upgrade your system

With its ready to use preamplifier electronics and the flexible mounting options, the Rococo Preamplifier Module makes it easy to use the benefits of the Rococo SDD's in your system. Get your Rococo Preamplifier Module and profit from the great advantages it has to offer.

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