

The Thermo Scientific NanoTrace liquid nitrogen-cooled Si(Li) X-ray detector provides microanalysts with the ultimate in performance with high resolution and low-energy sensitivity in a wide range of detector sizes. In addition, we guarantee its detector performance on your microscope.

## NanoTrace

Si(Li) X-ray detector

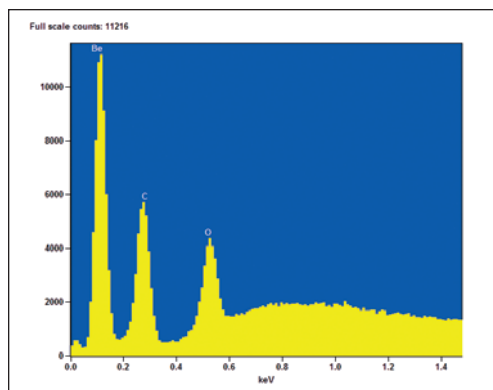


Figure 1: Beryllium spectrum at 10 kV and 30° take-off angle (TOA)



With more than 35 years of X-ray detector design and development, we introduce the latest improvement in lithium-drifted silicon (Si(Li)) detectors. The Thermo Scientific NanoTrace™ X-ray detector provides unprecedented performance for all sizes of X-ray sensors. The NanoTrace detector is available in sizes from 10 mm<sup>2</sup> to 50 mm<sup>2</sup> active areas for more than 900 configurations of electron microscopes.

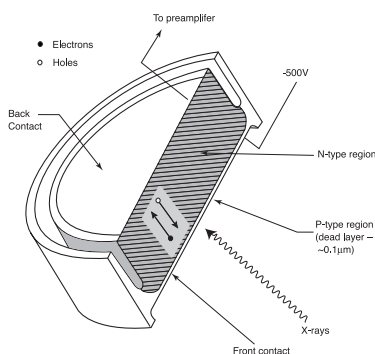
The NanoTrace detector is designed with no compromises. Both low-energy sensitivity and high resolution are maintained allowing accurate qualitative and quantitative analysis. Our engineers have adapted the quantitative routines in the NORAN System 7 microanalysis system to reflect the improved low-energy performance of the NanoTrace, ensuring the highest accuracy regardless of the detector type.

### A Solid History of Innovation

Founded on the successful legacy of Kevex Instruments, Nuclear Semiconductor and Tracor Northern products, Thermo Scientific solid state X-ray detectors feature the latest advancements in detector technology. Starting with its first detector in 1968 to today's NanoTrace detector, we have led the industry in high performance solutions for microanalysis applications.

#### Developments leading to the NanoTrace include:

- 1968 Kevex SEM detector
- 1973 MicroTrace SEM detector 165 eV
- 1977 Hypersense SEM/TEM detector with a tilted crystal 148 eV
- 1980 Time-variant pulse processor
- 1982 Light-element pulse processor
- 1982 MicroZHV gatevalve detector with parylene window
- 1983 Electron hardening for TEM applications
- 1985 MicroZ dual-window detector with both Be and parylene windows
- 1987 Quantum window
- 1990 SuperDry LN-free detector
- 1990 Pioneer detector
- 1990 Explorer HPGe detector
- 1991 Norvar window allowing Be detection
- 1994 Digital pulse processor
- 1994 Freedom LN-free detector
- 1994 Extreme resolution Pioneer detector 129 eV
- 1995 CryoCooled LN-free detector
- 2001 SuperDryII LN-free detector
- 2004 UltraDry Silicon Drift detector
- 2005 NanoTrace Si(Li) Detector



Cross section of Lithium-drifted Silicon Detector

## Improved Sensitivity

The NanoTrace detector has improved sensitivity below 1 keV. An innovative manufacturing process ensures that all detectors have consistent low-energy performance. Examples of the improvement are shown in this Product Specification. They include a 58% increase in oxygen detection in SEM and a 73% increase in TEM.

## ISO 15632 Compliant

Quality of the detector delivered to your lab is important to us. To ensure quality and consistency, the design of NanoTrace detector and its manufacturing process are compliant with the ISO 15632:2002(E) standard. This standard describes methods for measuring the performance of energy dispersive X-ray detectors including, resolution, peak to background, peak ratios and energy linearity.

## Guaranteed Performance

Quality of analysis requires excellent performance from the detector. To ensure the highest quality each NanoTrace detector is tested on your scanning electron microscope during installation for resolution when attached for a NORAN System 7 analyzer. All resolution specifications are measured using methods described in ISO Standard 15632:2002(E).

## Specifications

Liquid Nitrogen Dewars:

- LN Dewar Options:  
1, 3, 7.5 or 10 liter
- LN Consumption:  
< 1 liter per day for a 7.5 liter dewar

Detector Slide Motor Control:

- Standard on most TEM/STEM detectors
- Insert, Retract and jog movement
- Automatic retract when attached to compatible TEM/STEMs
- Automatic blanking of electron beam during retract on compatible TEM/STEMs

Detector Shutter:

- Protects detector from particulate damage or corrosive environment in FIB or variable pressure microscopes

## Resolution

ACTIVE AREA [mm <sup>2</sup> ]	MN-K $\alpha$ RESOLUTION [eV]	F-K $\alpha$ RESOLUTION [eV]	C-K $\alpha$ RESOLUTION [eV]
10	132	75	70
10	129	65	62
30	138	85	80
30	134	80	72
40	143	94	88
40	138	85	80
50	154	110	106
50	148	102	96

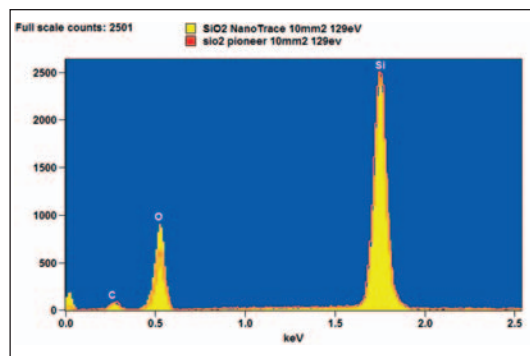


Figure 2: SiO<sub>2</sub> spectra taken in a SEM at 15 kV and 30° TOA

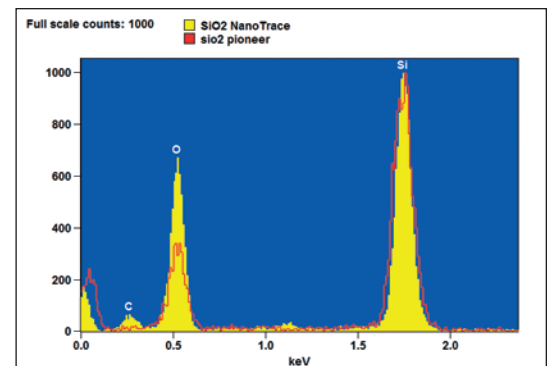


Figure 3: SiO<sub>2</sub> spectra taken in a TEM at 200 kV

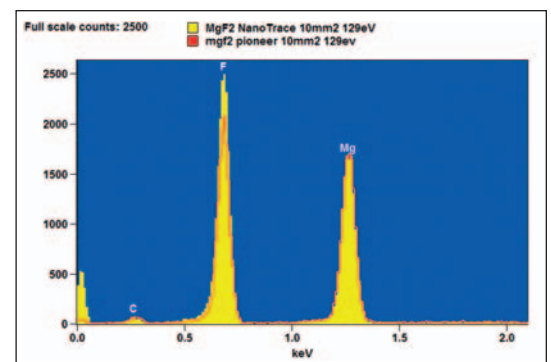


Figure 4: MgF<sub>2</sub> spectra taken at 10kV and 30° TOA