

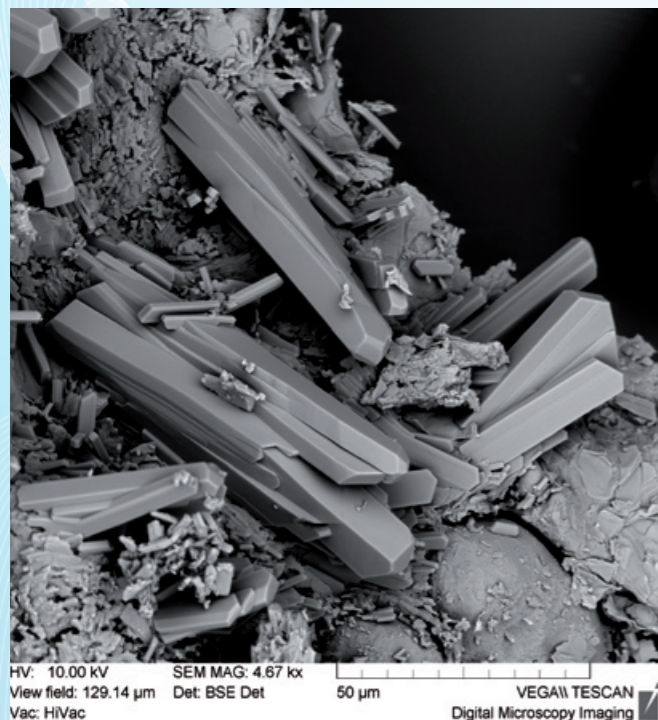


Scintillation Detectors for Electron Microscopy

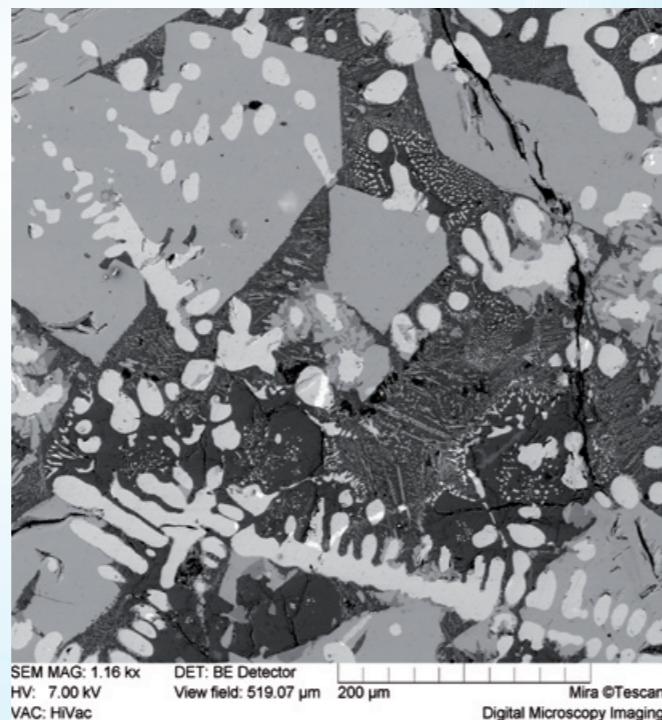
Scintillation Detectors for Electron Microscopy



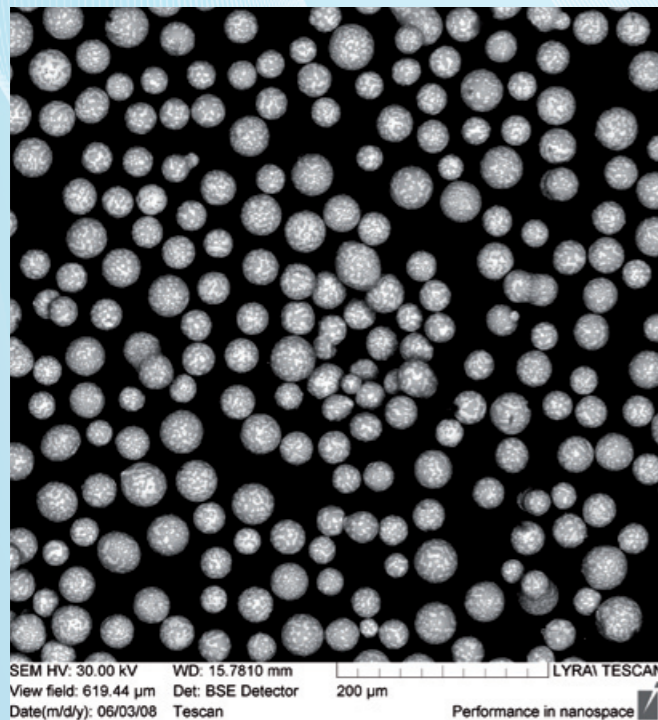
BSE Images



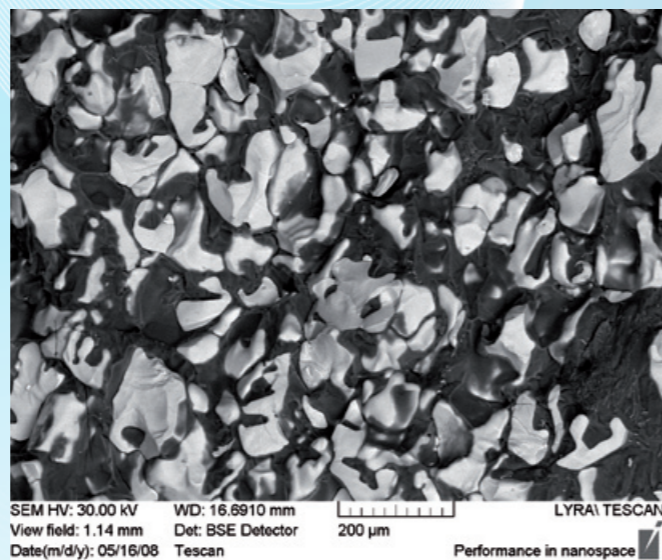
Crystalline Acetylsalicylic acid in Aspirine (uncoated in low vacuum)



Multiphase morphological analysis of furnace slag



Phase distribution in micro-powder SnPb solder



Mo precipitation in silicon rods

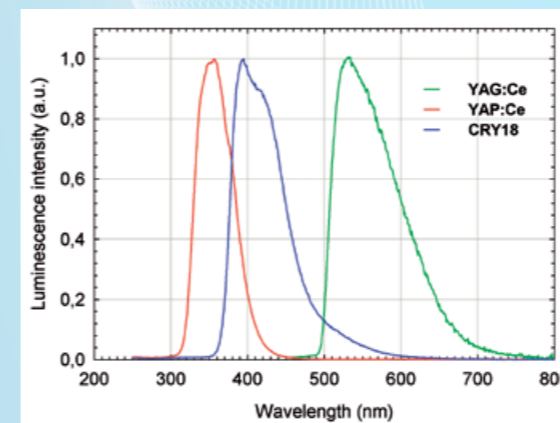
- Crytur is a worldwide leader in scintillation detector technology for electron microscopy
- Crytur supplies OEM and custom detection units for both SEM and TEM equipment

Scintillator Materials

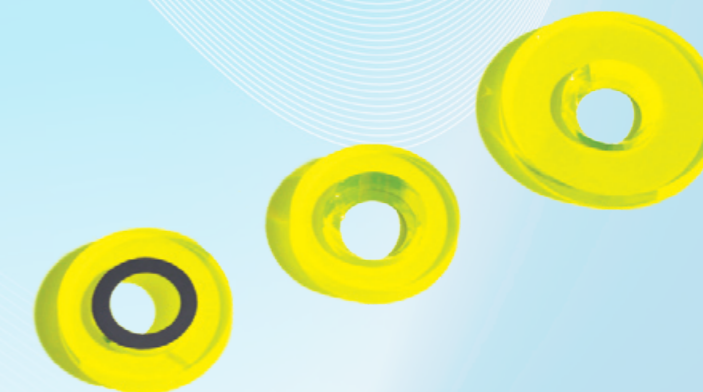
Mixed oxide crystals (garnets, perovskites and silicates) activated by Ce³⁺ are fast, high yield scintillators with excellent mechanical properties, extreme chemical resistance and perfect vacuum compatibility.

	YAG:Ce	YAP:Ce	CRY18
Density (g/cm ³)	4.57	5.37	4.50
Hardness (Mho)	8.5	8.6	5.8
Crystal structure	cubic	rhombic	monoclinic
Hygroscopic	no	no	no
Cleavage	no	no	yes
Refraction index	1.82	1.95	1.79
Peak wavelength (nm)	550	370	425
Decay time (ns)	70	25	40
Photon yield (photons/keV)	35	25	30
Spectral matching to bialkali PMT – integral quantum efficiency (%)	6	20	21

Parameters of single crystal scintillators



Emission spectra of scintillation crystals



Scintillators for BSE detection

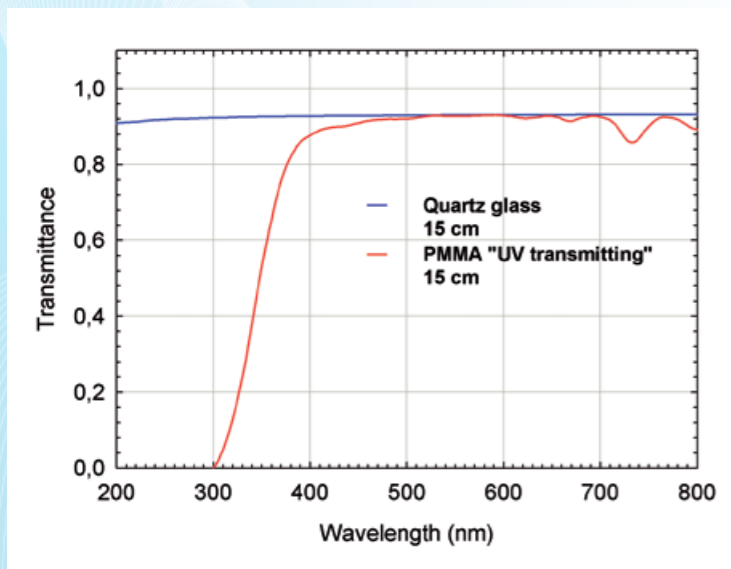


Scintillation Detectors for Electron Microscopy

Lightguide Materials

Lightguides use total internal reflections or reflections on a reflective metal coating to transport light to the optical detector

- Quartz glass
- PMMA with enhanced UV transmission



Transmittance spectra of lightguide materials



Lightguides

Functional Thin Layers

The detection surface of scintillator must be coated to prevent charging. Conductive coatings can be made so thin that they transmit 1keV electrons!

CONDUCTIVE COATING

- Al (for light-tight coating, detection surface)
- ITO (detection surface, high chemical and mechanical resistance)
- C (low energy detection)
- Conductive micro-grid (low energy detection)

HIGH REFLECTIVITY/ANTI-REFLECTION/PROTECTION COATING

- Al (high-reflectivity)
- MgF (anti-reflection, mechanical protection of Al)
- ITO (mechanical protection of Al coating)
- Au thick metal stop layer for scattered primary electrons

Scintillation Detectors for Electron Microscopy



Detection Units

- Unlimited lifetime due to extreme radiation hardness
- Tested and certified for detection efficiency
- OEM detection units supplied with all mechanical parts and electronics

SEM Detectors

SE (secondary electrons)

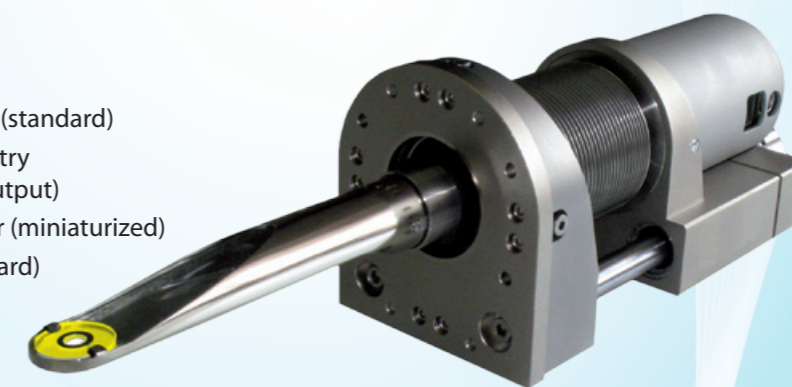
- Flat scintillator (standard)
- Conical geometry (higher light output)
- On optical fiber (miniaturized)

BSE (back-scattered electrons)

- Annular (standard)
- Segmented
- In-lens (small aperture down to 0.3mm)

CL (cathodoluminescence)

- Universal quartz lightguide working at any WD



Retractable BSE detection unit including vacuum bellows, PMT and preamplifier

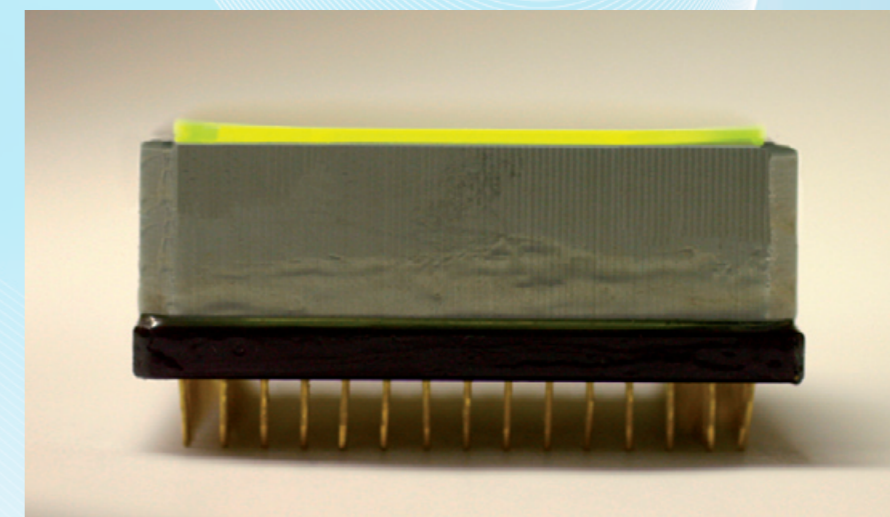
TEM Detectors

STEM detectors

- ADF
- HAADF
- BF

TEM detectors

- Imaging Screens for High-resolution Based on FOP and Thin Single Crystal Screen



High-resolution scintillating screen on fiber optics plate and CCD chip