

# SPI SUPPLIES

## YAP SCINTILLATORS



SPI Supplies  
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### About SPI Supplies YAP Scintillators

*YAP provides the best of both worlds: P-47 and YAG.*

Emission characteristics of a P47 - using the same photomultiplier - plus the durability of the YAG, with a decay time of the YAP crystal being faster than the YAG crystal (40ns vs. 80ns).

#### Characteristics:

- Chemical Formula:  $YAlO_3$
- Excellent signal-to-noise ratio.
- TV compatible with fast decay time (40ns).
- High temperature tolerance, Bakeable to 400 °C.
- Easily detects samples high in cathodoluminescence i.e. gallium arsenide.
- Atomic number differences of 0.1 on object analysis.
- Refractive index: 1.82
- Bulk density: 4.551
- Aluminum coated on polished side.
- High resistance to radiation damage.

<b>Physical Properties:</b>	<b>YAG</b>	<b>YAP</b>
Density ( $g/cm^3$ )	4.57	5.37
Hardness (Mho)	8.5	8.6
Index of refraction	1.82	1.95
Crystal structure	Cubic	Rhombic
Melting point, °C	1970	1875
Hygroscopic	No	No
Linear coefficient of thermal expansion, $10^{-5}/K$	0.8-0.9	0.4-1.1
Cleavage	No	No
Chemical formula	$Y_3Al_5O_{12}$	$YAlO_3$

### **Luminescence properties:**

Integrated light output (%NaI: Ti)	15	40
Wavelength of maximum emission (nm)	550	370
Decay constant, ns	70	25
After glow (% at 6 ms)	<0.005	<0.005
Radiation length (cm)	3.5	2.7
Photon yield at 300 °K (10 <sup>3</sup> Ph/MeV)	8	10

The SPI Supplies YAP crystal emits a spectrum peaks at 378nm (close to the S-11's maximum sensitivity), meaning your SEM does not have to be refitted with a more sensitive photomultiplier. All YAP scintillators should be aluminum coated prior to use in an SEM application and therefore, the SPI Supplies YAP scintillators come with a 50 nm aluminum coating. The YAP crystal can be supplied without the aluminum coating; this needs to be requested when ordering.

### **Thickness:**

Thickness can be between 0.5 to 1.0mm, because the thickness for SEM application is not important except where specifically noted. For non-SEM applications where a more specific thickness (e.g. 0.5mm) is important, this would need to be specified when ordering (an additional charge may apply).

### **Flatness:**

The flatness, in terms of fractional wavelength is 1/4  $\lambda$  standard. We can also provide 1/8 and 1/10  $\lambda$ ; these would need to be special ordered (an additional charge may apply).

### **Cleaning:**

Contaminated single crystal scintillators can be put back into a usable form by washing the aluminum away with a five minute bath in a 10% NaOH (in water) solution. Then rinse in distilled water and after drying, apply a new aluminum coating by vacuum evaporation.

We have tried to list the manufacturer's designated dimensions for scintillators installed in their factory manufactured SEMs. If you believe you have some modified scintillator in your SEM, we would strongly suggest checking the dimensions of your own scintillator before placing your order.

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