

# SPI SUPPLIES

## YAG SCINTILLATORS



SPI Supplies  
206 Garfield Avenue,  
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### About SPI Supplies YAG Scintillators

*Extra long life... Ultrahigh transmission!*

Made of yttrium aluminum garnet activated with trivalent cerium, the YAG exhibits ultrahigh light transmission-97% at 560nm.

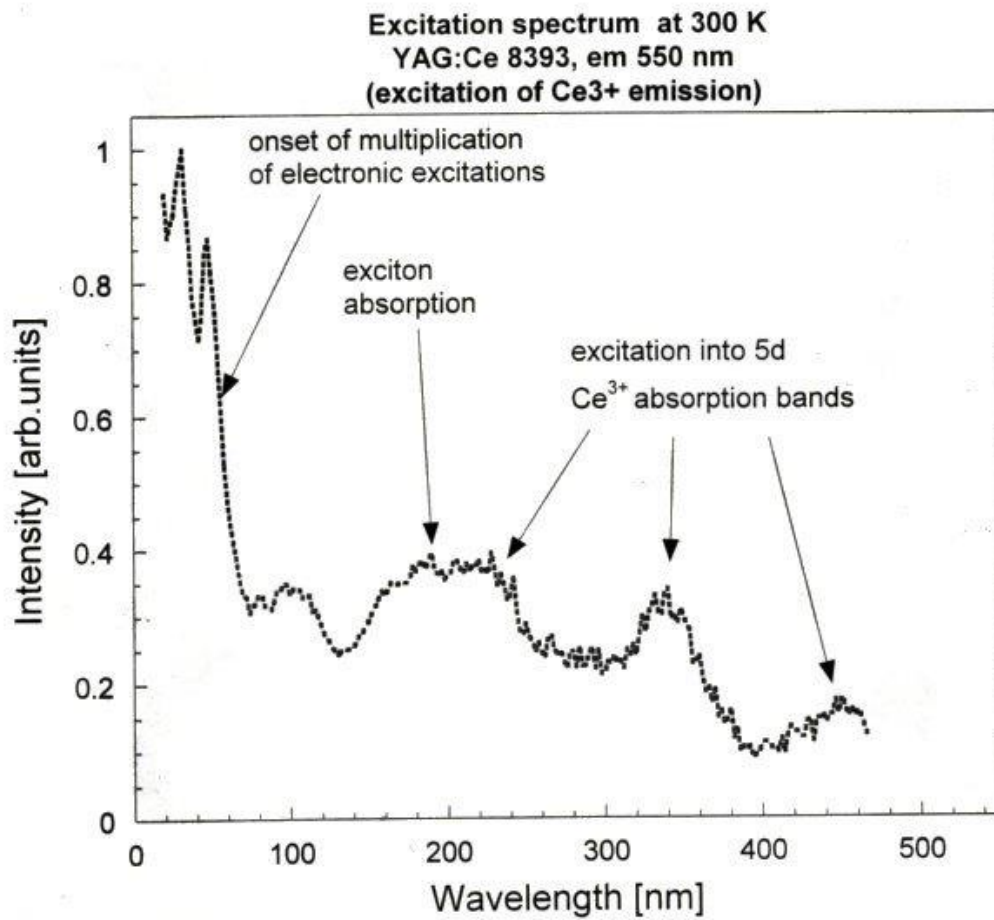
#### Characteristics:

- Excellent signal-to-noise ratio.
- TV compatible with fast decay time (80 ns).
- High temperature tolerance, Bakeable to 400 °C
- Easily detects samples high in cathodoluminescence i.e. gallium arsenide.
- UHV "compatible", even more so than a coated P-47 scintillator
- Atomic number differences of 0.1 on object analysis.
- Chemical formula:  $Y_3Al_5O_{12}$
- Refractive index: 1.84 at 550 nm
- Bulk density: 4.551 g/cm<sup>3</sup>
- Aluminum coated on polished side for instant installation in your SEM which can be removed with NaOH solution.
- Standard shapes: Discs from 5 to 40 mm, 0.5 to 1.0 mm in thickness, one side polished, other side matte ground.
- High resistance to radiation damage

<b>Physical Properties:</b>	<b>YAG</b>	<b>YAP</b>
Density (g/cm <sup>3</sup> )	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 <sup>-5</sup> /K	0.8-0.9	0.4-1.1
Cleavage	No	No
Chemical formula	$Y_3Al_5O_{12}$	$YAIO_3$

**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 maximum output of the YAG scintillator is at 560 nm which is quite different from the output for P47 scintillators otherwise used in SEMs. Hence the S11 PMT found in most SEMs as standard equipment will not produce the optimum performance when using a YAG; consider converting the PMT to an S20 type PMT which is optimized for accepting light emission at 560 nm. If the PMT will not be changed, then we would suggest converting to a YAP instead of a YAG so that the existing style S11 PMT can still be used.

**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  $1/4 \lambda_{\text{standard}}$ . 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.

**EER 2/17**