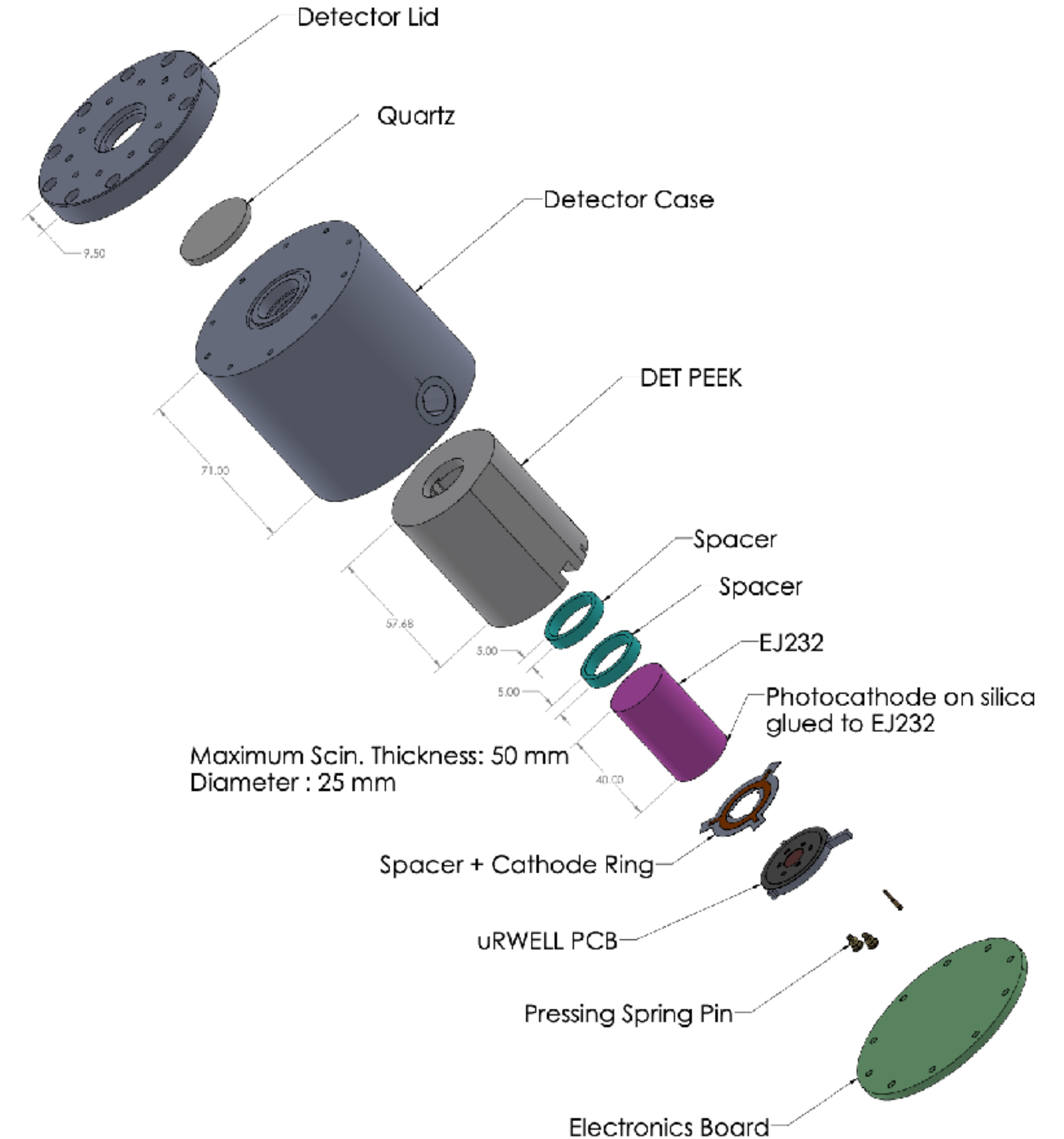
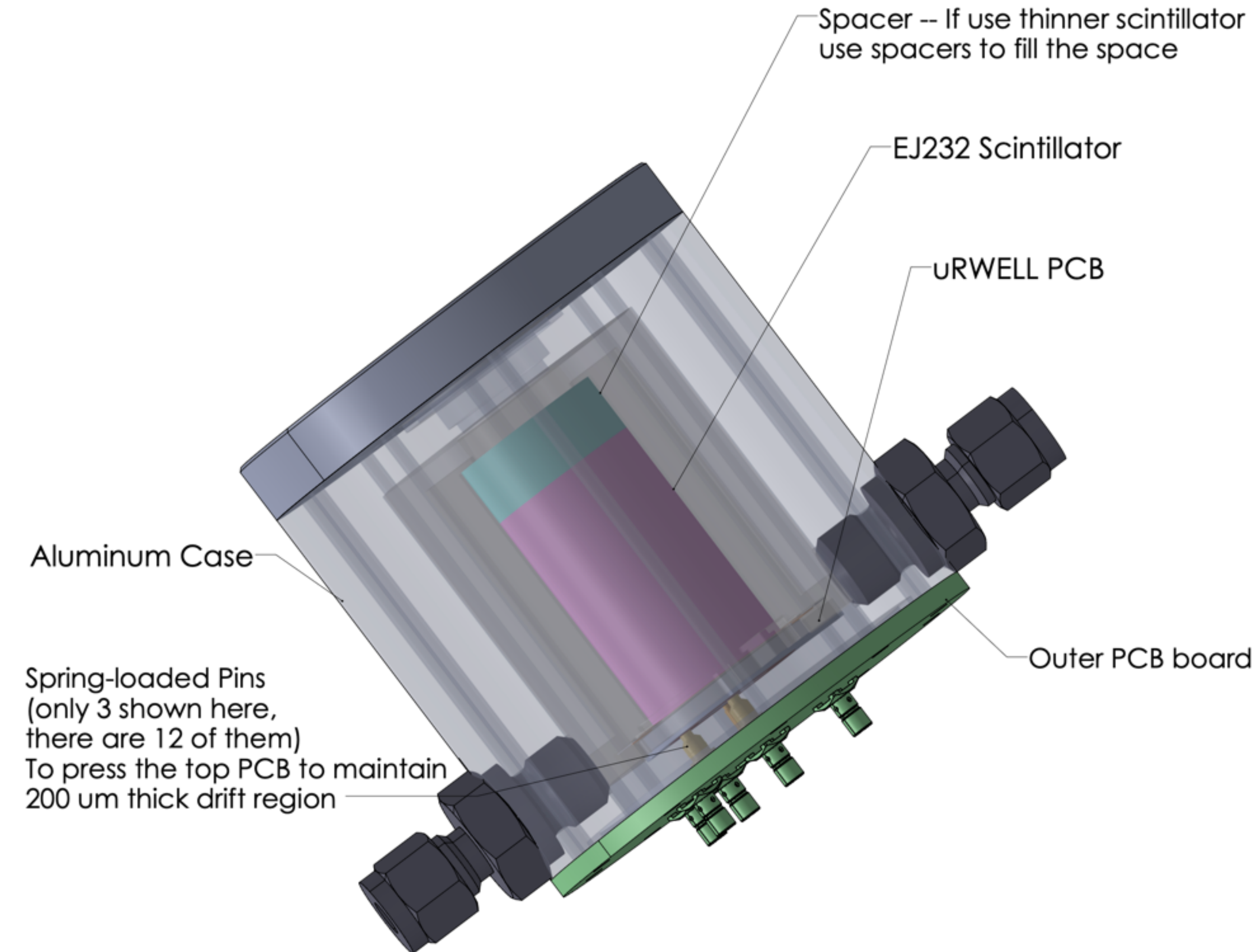


MPGD-nTOF Biweekly Meeting

November 19, 2025

Detector CAD Design



Substrate for photocathode K_2CsSb

- Deposit photocathode on 25 mm diameter, 0.2 mm - 2 mm thick, **UV-rated Fused Silica**

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KW22-020 UV Grade Fused Silica High Precision Windows

Diameter: 20.0mm ;Thickness: 3.0mm

US\$57.57

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TECHSPEC® Ultra-Thin Fused Silica Windows

- Ultra-Thin 0.20mm Thickness
- UV Fused Silica Substrates
- Extremely Lightweight

TECHSPEC® Ultra-Thin Fused Silica Windows provide the benefits of fused silica including low thermal expansion, excellent chemical resistance, and UV transmission with a thickness less than 1/5th of our standard fused silica windows. Unlike traditional cover glass, these windows have polished surfaces to provide consistent transmitted wavefront distortion, making them advantageous for OEM applications. Their extremely thin designs make them ideal for both weight and size sensitive applications, especially those requiring broadband transmission from the UV to the NIR. TECHSPEC Ultra-Thin Fused Silica Windows are ideal for handheld medical devices, wearable technology, and portable UV lights.

Common Specifications			
Bevel:	Protective as needed	Thickness (mm):	0.20 ±0.025
Edges:	Fine Ground	Knoop Hardness (kg/mm²):	522.00
Parallelism (arcsec):	<1	Poisson's Ratio:	0.16
Young's Modulus (GPa):	73	Abbe Number (v _d):	64.17
Index of Refraction (n _d):	1.458	Surface Quality:	60-40
Transmitted Wavefront, P-V:	λ/2	Coefficient of Thermal Expansion CTE (10 ⁻⁶ /°C):	0.52 (+5 to +35°C) 0.57 (0 to +200°C) 0.48 (-100 to +200°C)

3

Preparation of Photocathode Manufacturing at JLab

1. Preparation for Photocathode manufacturing in JLab
 1. HTC not an option — concern of pollution to deposition chamber
 2. Loading dock option
 3. Coordinating CIS for vacuum chamber design to fit the loading dock
 4. Photocathode assembly to detector

Photocathode Assembly Plan

- Assemble photocathode to detector in a ~~UHP N2 gas sealed~~ glove box

- ~~Light-controlled environment, IR red light only~~

- Assembly stand in cleanroom

according to John, UHP N2 doesn't work,
Need to keep H2O less than 10^{-10} level,
otherwise it kills photocathode instantly

Plastic glove box won't work, need to have vacuum
condition first

Per John's suggestion, this is not necessary, as long as there
is no bias voltage on the photocathode, it is fine, they did this
assembly before



Home / Glovebox Systems / Isolation Standard Glove Box / Two-port Glovebox



Cleatech Glove Box, Two port, Clear Acrylic 2100-2-A

~~\$2,016.00~~ **\$1,680.00**

Savings: \$336.00

Availability: Usually Ships in 3-5 Days

Transfer Chamber Airlock:

No Airlock (Transfer Chamber)

Inert-Gas Options Gas Accessories:

No Gas Ports

purge control with RH or o2 sensor

No Automatic Purge Control Unit

o2 monitor

select option



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Eclipse MicroTent Portable Darkroom For the NightSEA Fluorescence System

SKU: SFA-TENT WEIGHT: 5.00 LBS SHIPPING: Calculated at Checkout

\$425.00

Quantity: ☐ 1 ☐

Chat

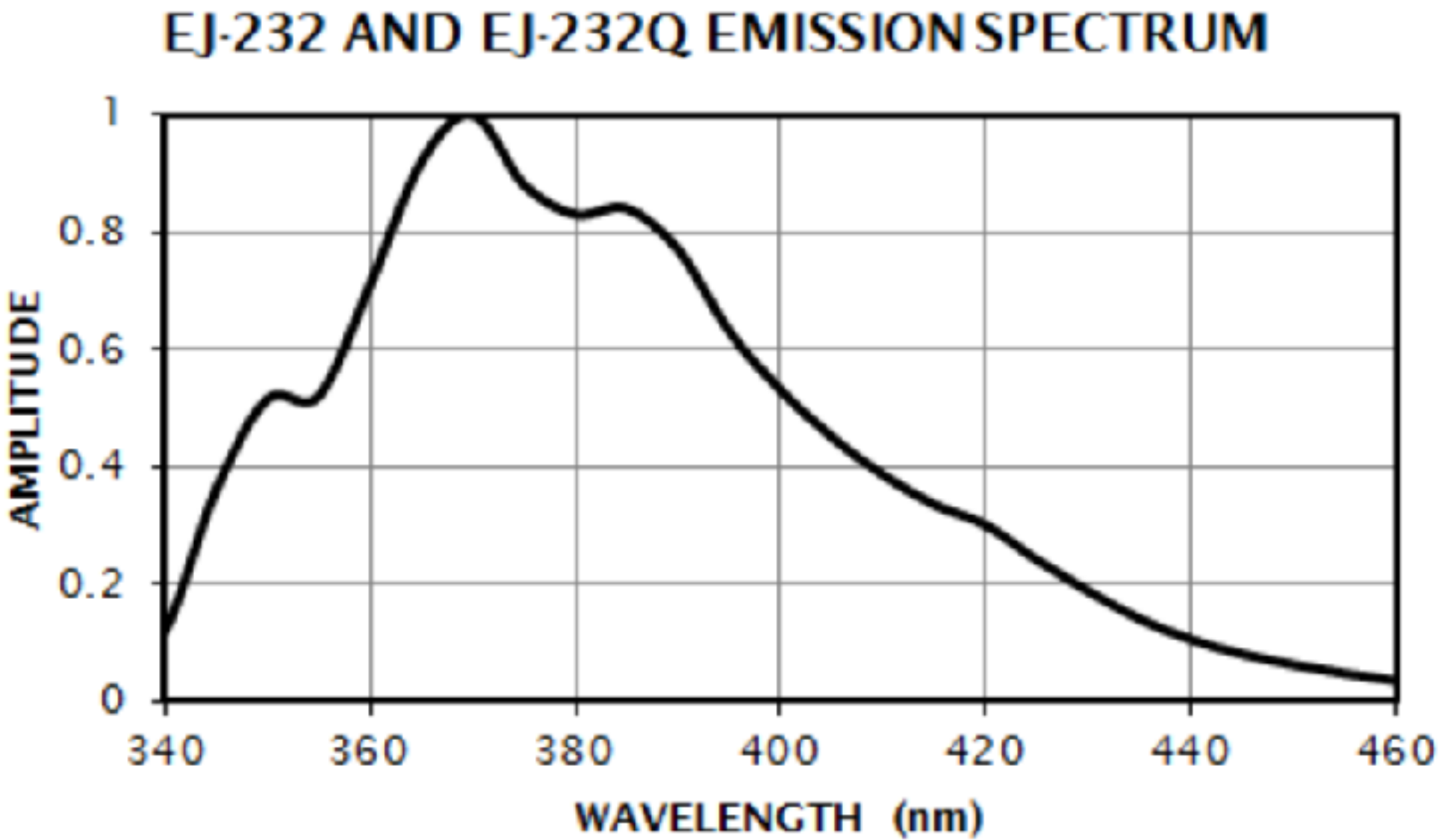
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https://www.msesupplies.com/collections/glove-boxes/acrylic-gloveboxes?srsId=AfmBOoqT22oanXSClhLOVTsNPtAb9GIldbNZCsgVzx51Anbg2EPZ_CqH

<https://www.stellarscientific.com/eclipse-microtent-portable-darkroom-for-the-nightsea-fluorescence-system>

Plastic Scintillator — EJ232

PROPERTIES	EJ-232	EJ-232Q (% Benzophenone)				
		0.5	1.0	2.0	3.0	5.0
Light Output (% Anthracene)	55	19	11	5	4	3
Scintillation Efficiency (photons/1 MeV e ⁻)	8,400	2,900	1,700	770	610	460
Wavelength of Maximum Emission (nm)	370	370	370	370	370	370
Rise Time (ps)	350	110	105	100	100	100
Decay Time (ps)	1600	700	700	700	700	700
Pulse Width, FWHM (ps)	1300	360	290	260	240	220
No. of H Atoms per cm ³ (x10 ²²)	5.13	5.12	5.12	5.12	5.12	5.12
No. of C Atoms per cm ³ (x10 ²²)	4.66	4.66	4.66	4.66	4.66	4.66
No. of Electrons per cm ³ (x10 ²³)	3.30	3.38	3.38	3.38	3.38	3.38
Density (g/cm ³)	1.023	1.023	1.023	1.023	1.023	1.023
Polymer Base	Polyvinyltoluene					
Refractive Index	1.58					
Softening Point	75°C					
Vapor Pressure	Vacuum-compatible					
Coefficient of Linear Expansion	7.8 x 10 ⁻⁵ below 67°C					
Light Output vs. Temperature	At 60°C, L.O. = 95% of that at 20°C. No change from -60°C to 20°C.					
Temperature Range	-60°C to 60°C					



<https://eljentechnology.com/products/plastic-scintillators/ej-232-ej-232q>

Questions & Discussion

1. Are there any different photocathode that can work for the application?

Photocathode	QE (370 nm)	Sensitive to O ₂ , H ₂ O, CO ₂ (relative to K ₂ CsSb)
Cs ₃ Sb	10-15%	Very sensitive (Similar or less robust)
Na ₂ KSb:Cs	10-20%	Sensitive (Similar robust)
Cs ₂ Te	Very low (cut-off: 342 nm)	More robust than K ₂ CsSb, can survive higher partial pressure and tolerate handling mistakes

Na₂KSb is probably better, more robust

2. Other activities currently on-going

1. Garfield simulation currently on going

2. Detector prototype CAD, Loading Dock Interface Vacuum Chamber CAD

Spectral response characteristics of transmission-mode alkali telluride photocathodes working from vacuum-ultraviolet to ultraviolet band

J. Vac. Sci. Technol. B 35, 061202 (2017)

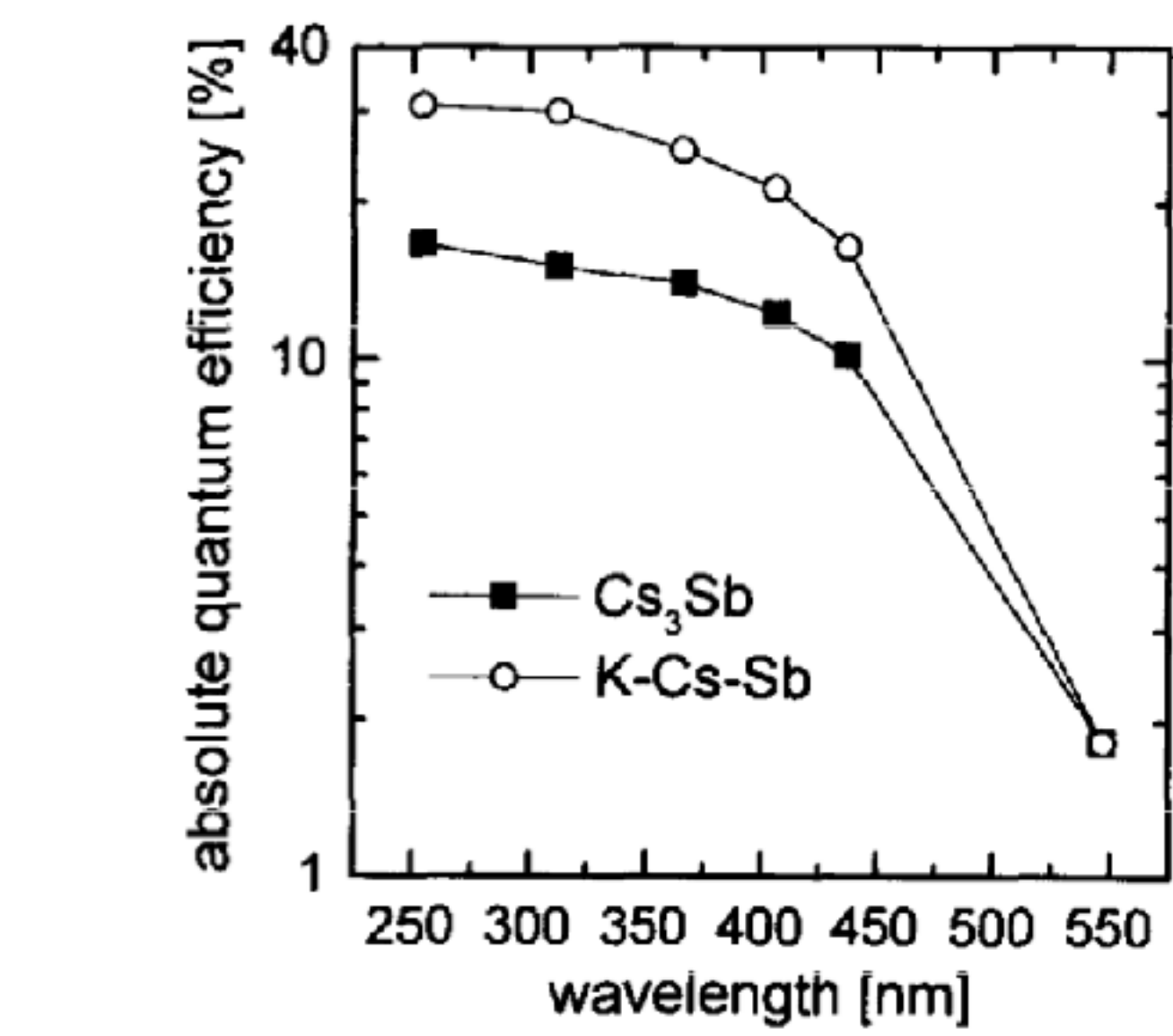
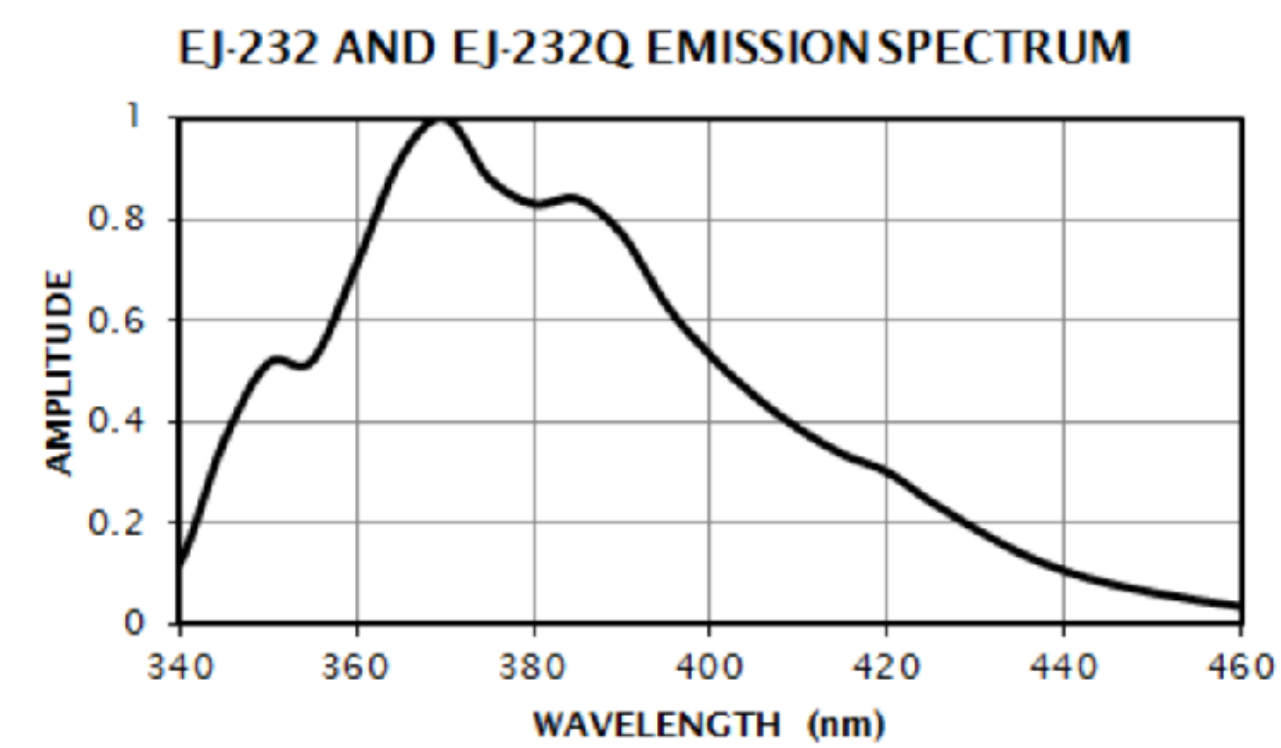
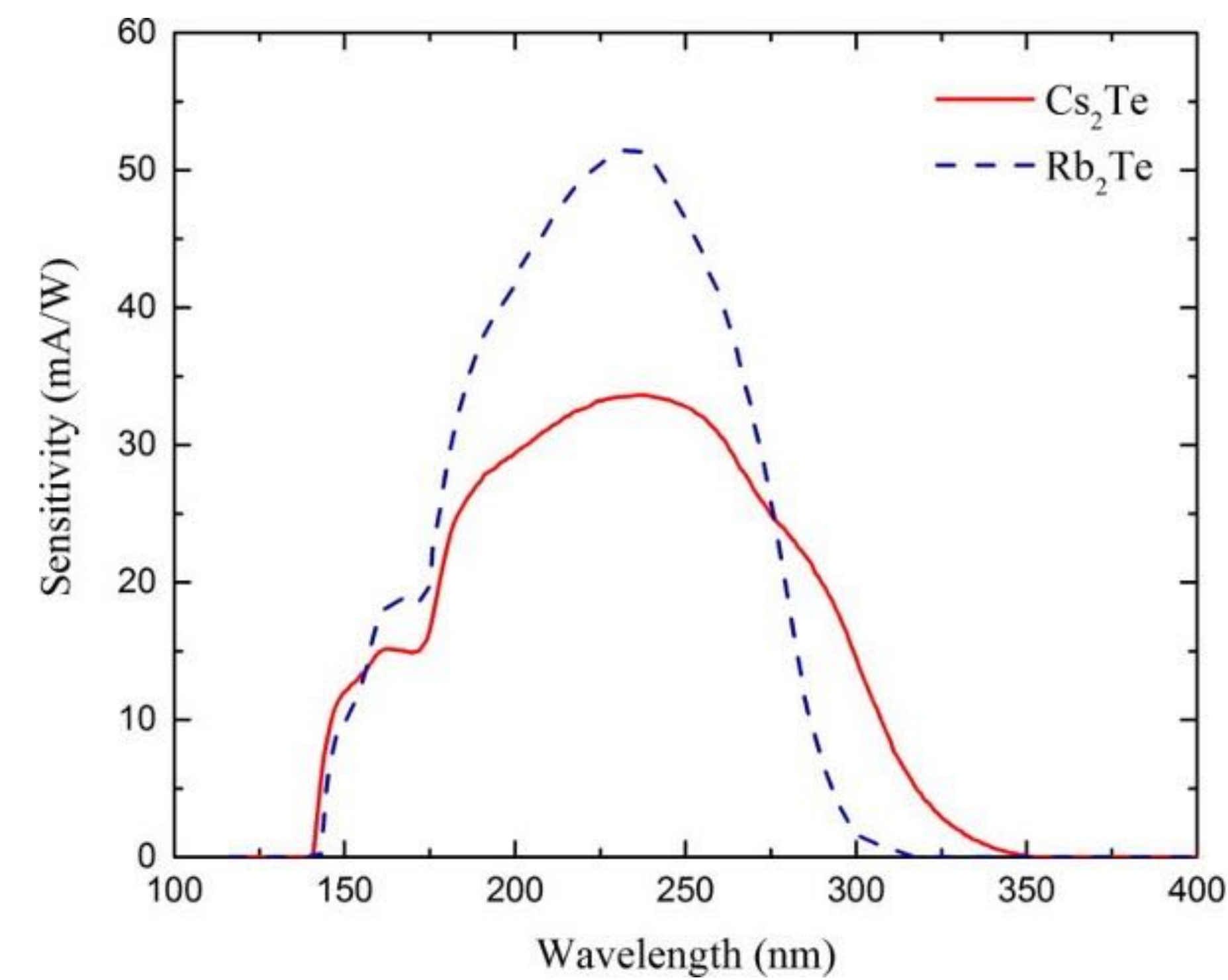


Fig. 3. Typical absolute quantum efficiency spectra of Cs_3Sb and K-Cs-Sb reflective photocathodes, prepared in this work.

Laboratory production of efficient alkali-antimonide photocathodes
Nuclear Instruments and Methods in Physics Research A 411 (1998) 383-388