spinSIGHTS
from the lab

In this issue: Sapphire windows offer optical transparency comparable to Quartz

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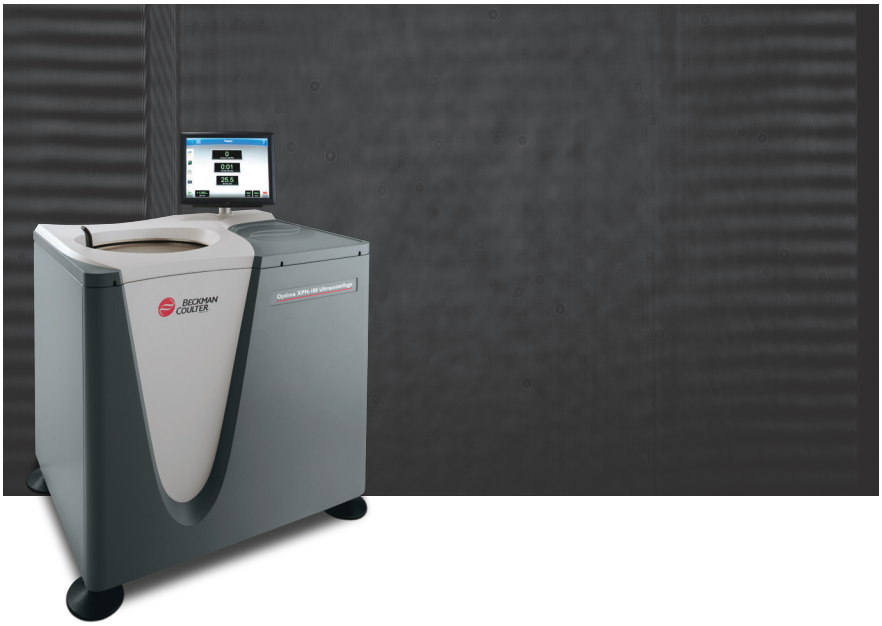

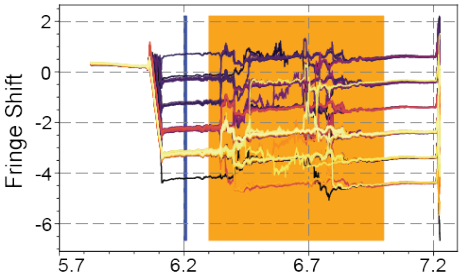

Can Sapphire windows be used for low-UV AUC experiments?

When do I use Quartz vs. Sapphire Windows in an Analytical Ultracentrifuge (AUC) experiment?

AUC experiments in Absorbance mode traditionally uses Quartz windows because of their excellent transmittance in the low UV range. Experiments in Interference mode use Sapphire windows because of their mechanical strength.

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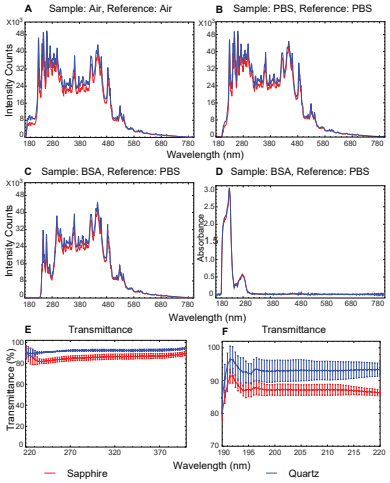
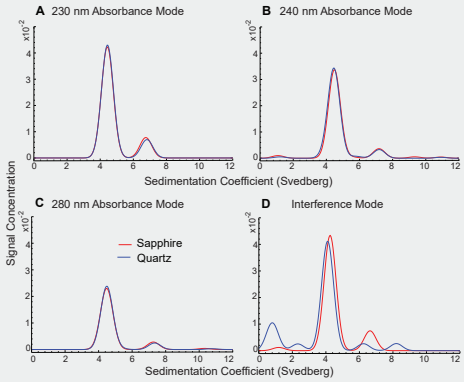
Sapphire vs. Quartz



Sapphire / Quartz Optics are comparable

Rubicon ES2 Sapphire (red trace) and Quartz (blue trace) Intensity scans for air, buffer and BSA protein samples in panel A, B & C respectively. (D) Absorbance profile for BSA protein for both window types. (E&F) show transmittance profiles of both window types. The optical performance of Sapphire windows is comparable to Quartz down to ~ 230 nm (peptide bond peak).



AUC performance is also comparable*

Analysis of results of SV-AUC experiments at 25 krpm on BSA protein sample are shown for Sapphire (red trace) and Quartz (blue trace) at three different wavelengths – 230, 240 and 280 nm in Panels A, B & C respectively. Panel D shows Interference results at 50 krpm. The sedimentation coefficient population distributions overlap, indicating identical results obtained from both window materials.

*Analysis software has not been verified or validated by Beckman Coulter Life Sciences

Better Interference data with Sapphire windows*

Rubicon ES2 Sapphire windows offer superior mechanical strength in comparison to Quartz windows – which results in less deformation at high speeds (> 50 k). This does not affect Absorbance data but can affect the quality of Interference data. This table shows the signal-to-noise ratio where the degradation for quartz-interference data can be seen.

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Window	Wavelength	Signal	RMSD	S/N ratio
Sapphire	230 nm	1.1257	0.00372105	302.5221376
Quartz	230 nm	1.1241	0.00562966	199.6745807
Sapphire	240 nm	0.89408	0.00315423	283.454282
Quartz	240 nm	0.90167	0.0030973	291.114842
Sapphire	280 nm	0.60687	0.00221209	274.342364
Quartz	280 nm	0.60674	0.00230937	262.7296622
Sapphire	Interference	11.702	0.042139	277.6999929
Quartz	Interference	13.352	0.578318	23.08764382

Summary

New generation Rubicon ES2 Sapphire windows can be used in Absorbance mode in AUC at wavelengths as low as 230 nm, yielding performance comparable to Quartz windows. For high speed applications (e.g., peptide analysis) – they also offer less noisy Interference data vs. Quartz.

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CENT-7287FLY06.20