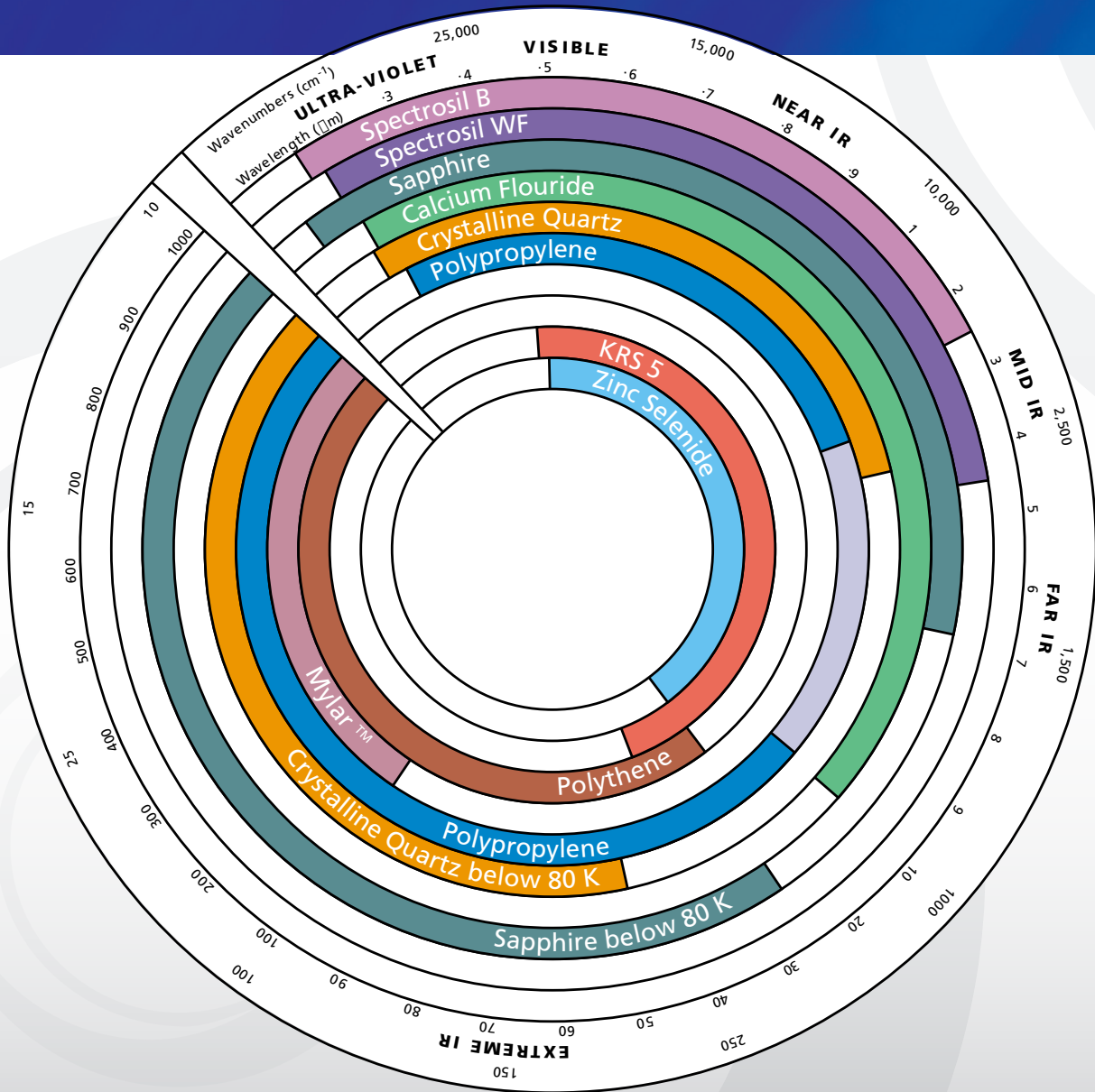


# SPECTROSCOPY

## Windows for cryogenic environments



Choosing the right windows for your experiments



*The Business of Science®*



## Extensive choice to suit your experimental needs

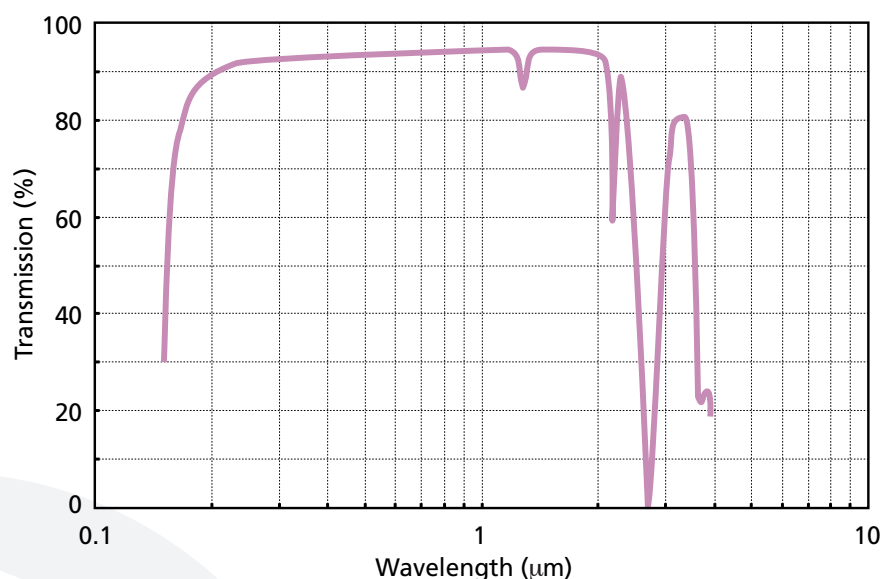
Many cryostats are used in experiments where the samples must be irradiated or measurements made on emitted radiation from such samples. Appropriate windows must be fitted to your cryostat to permit radiation to pass through the sample space.

### Window materials

The type of window material selected will be determined by the wavelength and intensity of the radiation, the environmental temperature and whether or not beam polarisation is required. Oxford Instruments offers a wide range of different window materials.

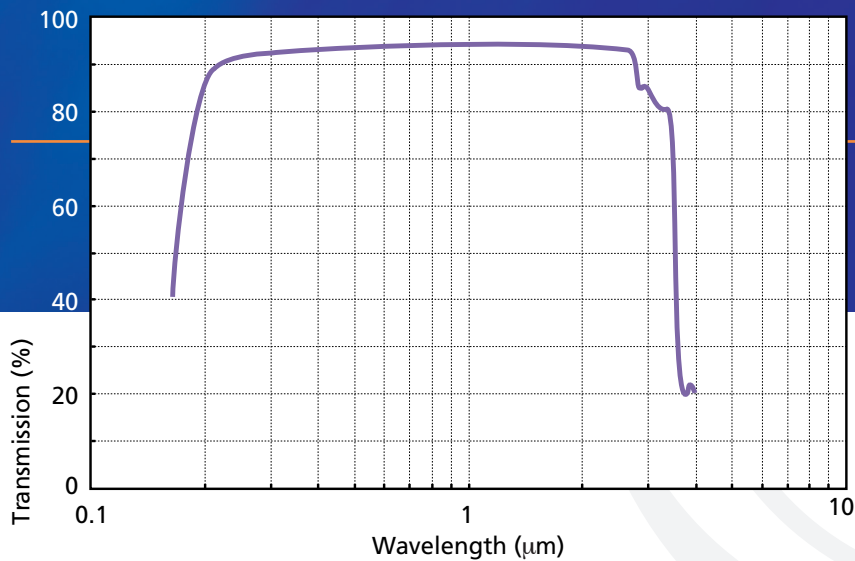
### Window mounting

Room temperature windows which must be vacuum tight are generally sealed onto a rubber 'O' ring. The mounting method minimises strain on the windows and allows easy removal if required. Radiation shield windows do not need to be vacuum tight but it is important that they are thermally anchored. This is achieved by retaining the window in a copper mount using a spring clip. The windows on sample cells must be vacuum tight at low temperatures and two sealing methods, indium or copper gaskets, are used depending on whether the upper temperature is limited to 300 K or 500 K respectively.



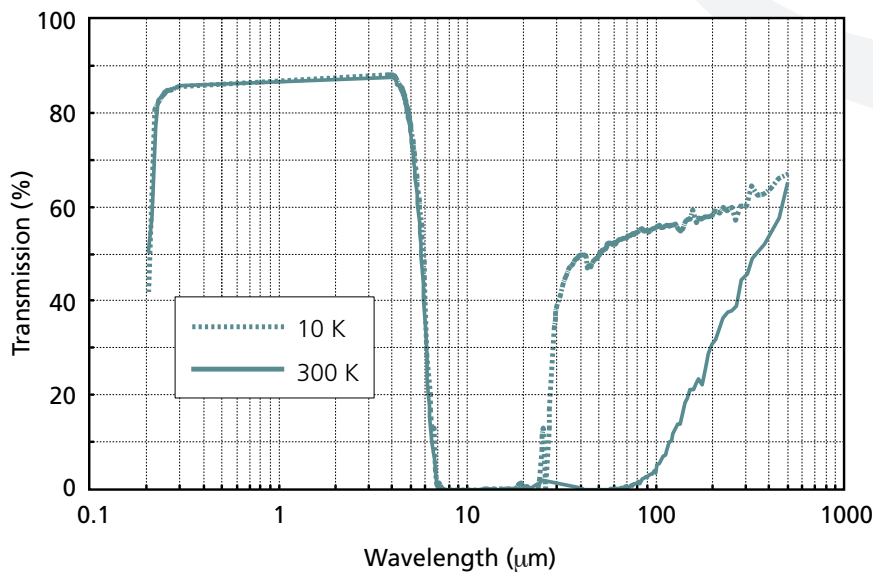
### Spectrosil B

Spectrosil B is a synthetic vitreous silica. The material itself is not birefringent and standard strain-relieved low temperature window mounts ensure that Spectrosil B windows do not affect polarised light. It is an excellent material for filtering out the near-mid IR room temperature thermal radiation, resulting in a low thermal load on the cryostat. The transmission data is for a 2 mm thick window.



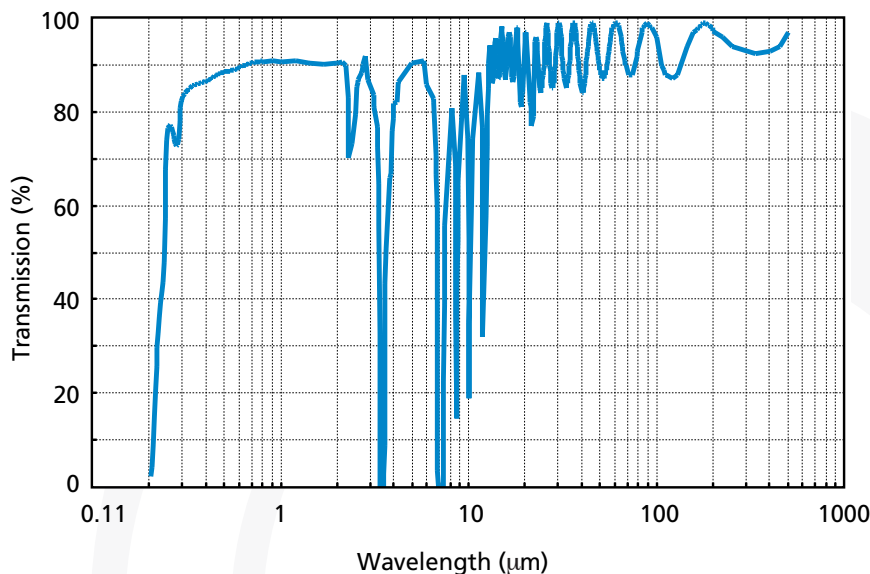
### Spectrosil WF

Spectrosil WF is a water free synthetic vitreous silica. It has the same material characteristics as Spectrosil B, but has a transmission range which extends further into the IR. The transmission data is for a 2 mm thick window.



### Sapphire

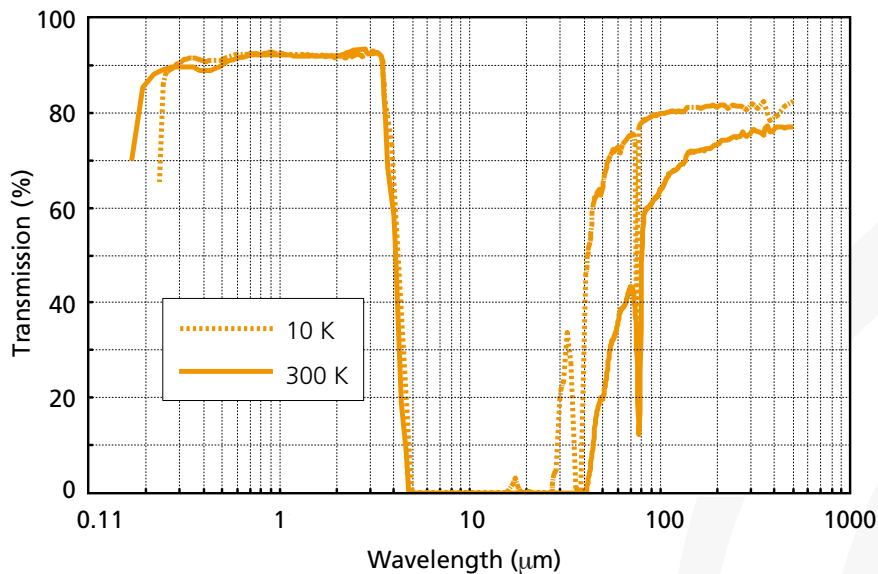
Sapphire is an alternative window for visible and near IR applications. It is the only window which may be used at high temperatures (up to 500 K). At temperatures below 80 K the transmission of sapphire increases in the extreme IR region. This effect allows sapphire to be used as a cold inner window for IR measurements. Sapphire is birefringent. The transmission data is for a 2 mm thick window.



### Polypropylene

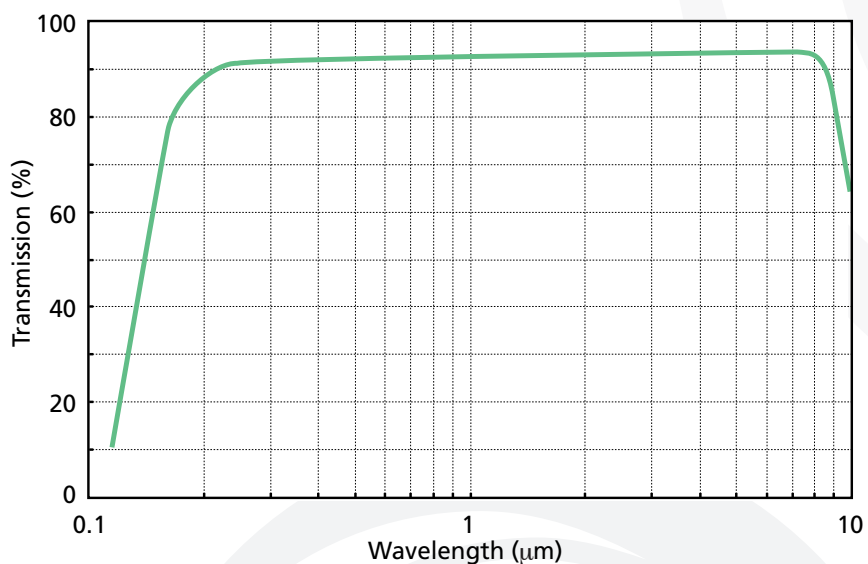
Polypropylene is a polymer with a useful transmission range which runs from 0.2 micrometers to the millimetre region with only a few absorption bands in the mid IR. At temperatures above 100 K this material is porous to helium gas. The transmission data is for a window 60 micrometers thick which may be used as a cold window to temperatures as low as 1.5 K. Polypropylene windows may be damaged if used with high power optical beams.

# SPECTROSCOPY



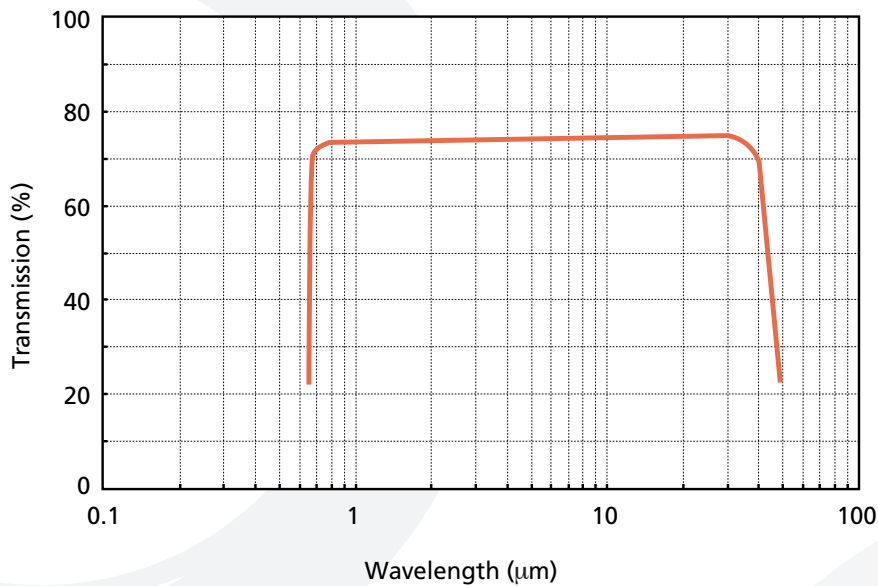
## Crystalline quartz

Crystalline quartz is a window for the visible and near IR. It exhibits a strong temperature dependence in the far IR. At temperatures below 80 K the transmission is greater than 70% for wavelengths greater than 80 μm. This material may be used as a cold inner window for far IR applications. Crystalline quartz is birefringent and is available cut with the z-axis normal to the window to reduce polarisation effects. The transmission data is for a 2 mm thick window.



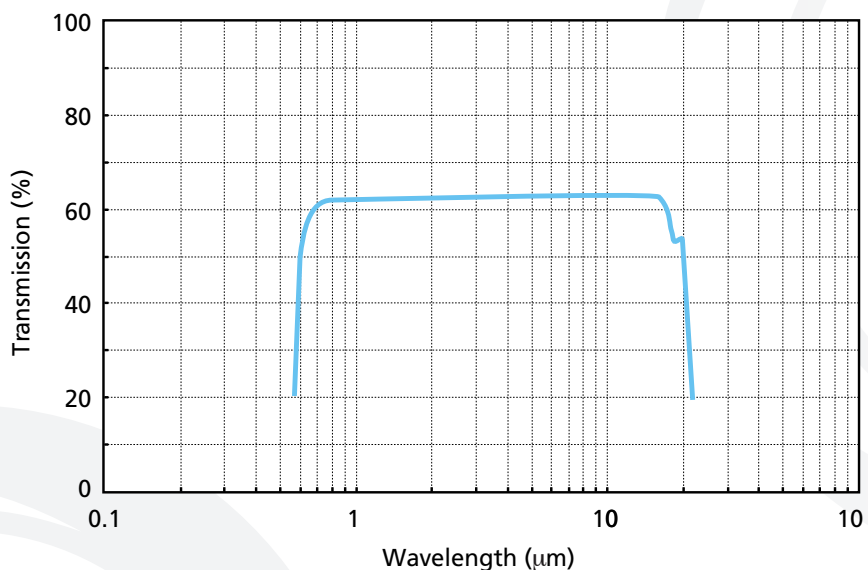
## Calcium fluoride

Calcium fluoride may be used in the near and mid IR. It cannot be used as a cold inner window due to its mechanical and thermal properties. The transmission data is for a 2 mm thick window.



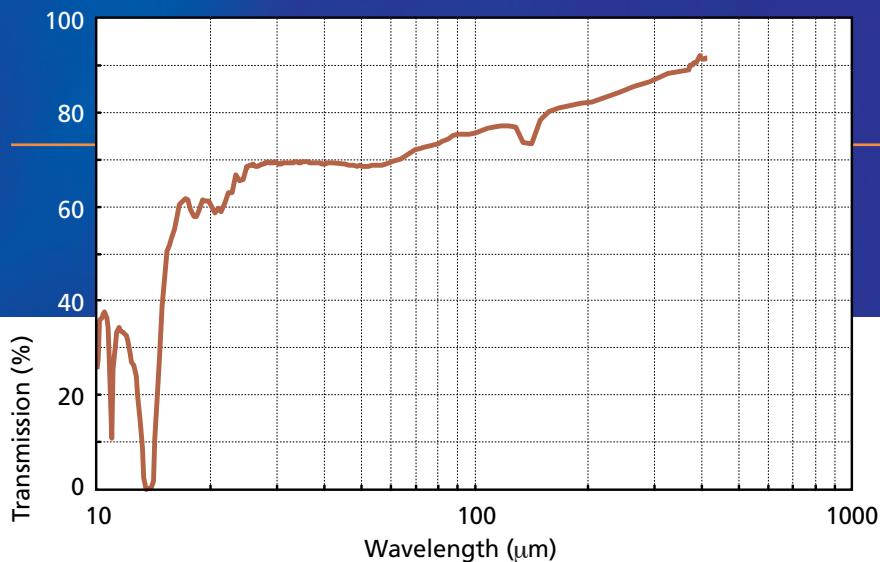
## KRS 5

KRS 5 (Thallium Bromide-Thallium Iodide) is a useful window for the mid IR. The complex nature of the cold window mount and the necessity to make it vacuum tight results in the clear access diameter being reduced by 2 mm when compared with other materials. The material is toxic and should be handled with care.



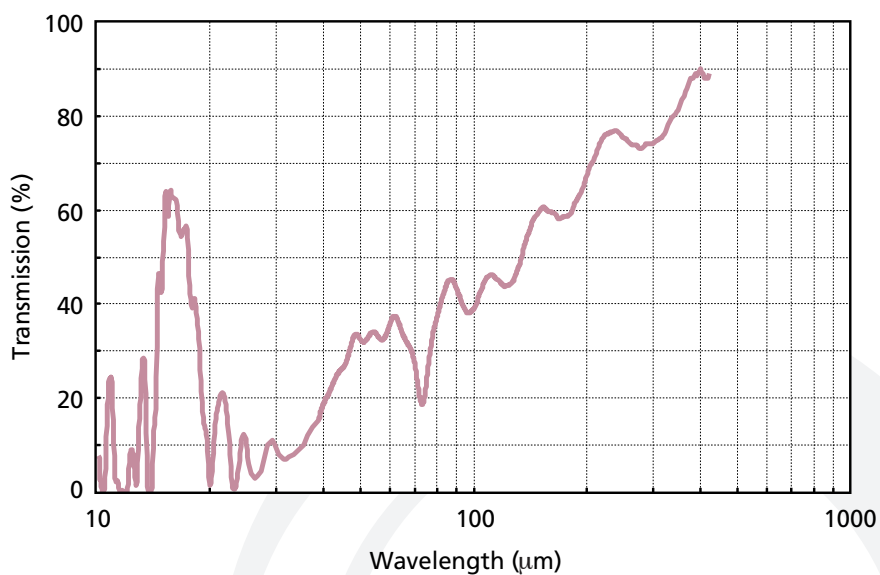
## Zinc selenide

Zinc selenide is a reliable cryogenic window for the mid IR. Care should be taken with handling as it is toxic and scratches easily. The transmission data is for a 2 mm thick window.



### Polythene

Polythene is a polymer which may be used in the extreme IR. The material is porous to helium gas above 100 K. The transmission data is for a 1 mm thick window.



### Mylar™

Mylar™ is a polyester film. Standard windows are 125 µm thick and may be used as a cryogenic window in the extreme IR. Mylar is porous to helium gas above 100 K.

### Aluminised Mylar™

Aluminised Mylar™ is a useful window for X-ray and gamma ray applications. For X-rays its transmission is greater than 90% with some diffuse scattering at low angles. Standard windows are 125 µm thick with a 0.3 µm thick aluminium coating on one side.

visit [www.oxford-instruments.com](http://www.oxford-instruments.com) for more information

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