

Diamond FL-Detector mounted on a OFHC holder

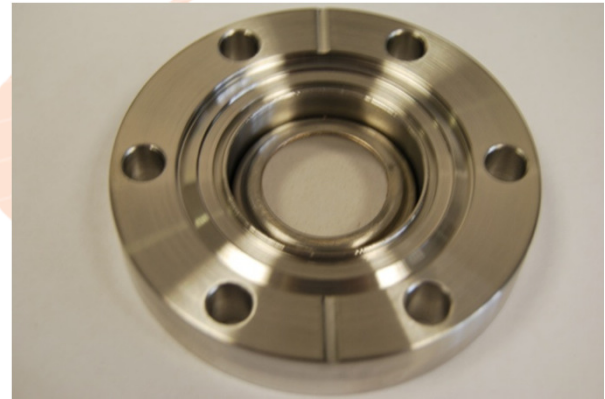


Diamond Fluorescence Screens, Windows & Absorbers.

Fluorescence screens generate fluorescence radiation which can be recorded and evaluated via a CCD camera and provide feedback on beam position and shape.

Diamond Detectors Ltd provide two grades of diamond Fluorescence materials FL and OP.

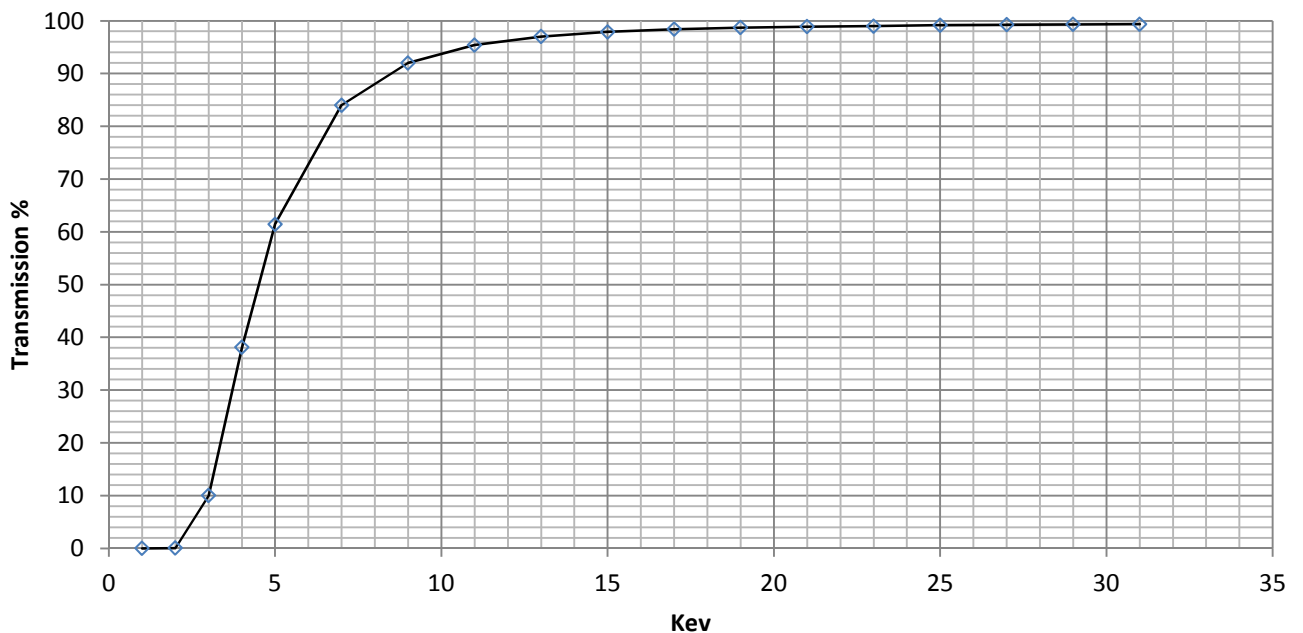
OP-Grade Fluorescence Detector mounted in a 70mm VPZ38. Clear aperture 21.25mm



The screen consists of a CVD-diamond foil with a very high thermal conductivity. This type of monitor can be used for high thermal loads (>1kW). The foil is typically mounted to a cooled OFHC copper flange.

FL-Grade materials are opaque and emit the fluorescence from the surface of the foil and OP-(optical grade) materials are transparent so the fluorescence is emitted from both the surface and bulk of the diamond.

Using diamond enables in-situ operation as the foil is typically 0.15mm thick. Its overall transmission amounts up to ~40%.



Transmission properties for 0.15mm Thick Diamond Foil

Sample Images of a combined Fluorescence Detector Screen & Window

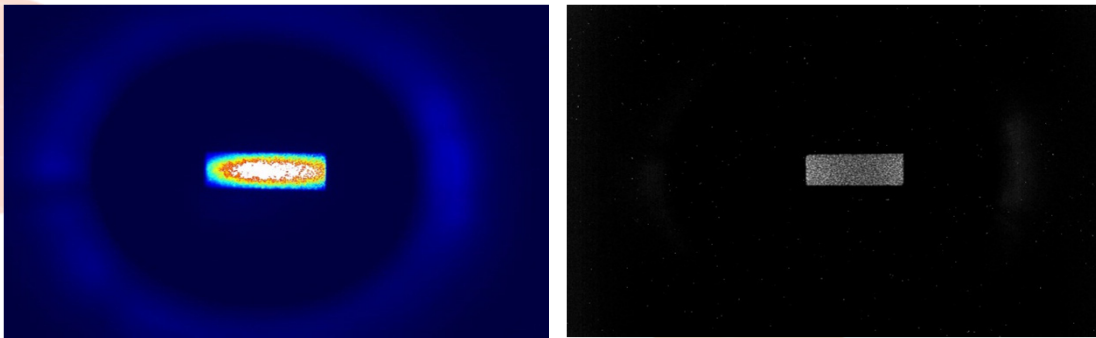


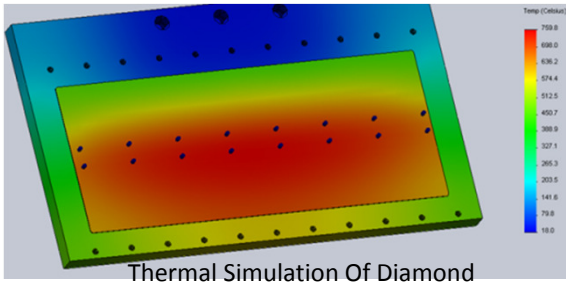
Image courtesy Diamond Light Source Oxford
Diamond Fluorescence Detector 1.1mm Thick 40mm Diameter. (Diamond Grade FL).

The images are of visible light fluorescence from the primary diamond window on the I12 (JEEP) beam line at Diamond Light Source.

Beam line I12 is a high energy beam line which uses a 4.2T superconducting multi-pole wiggler as the X-ray source. The X-ray beam incident on the diamond is the multi-wavelength **white beam** from the Wiggler.

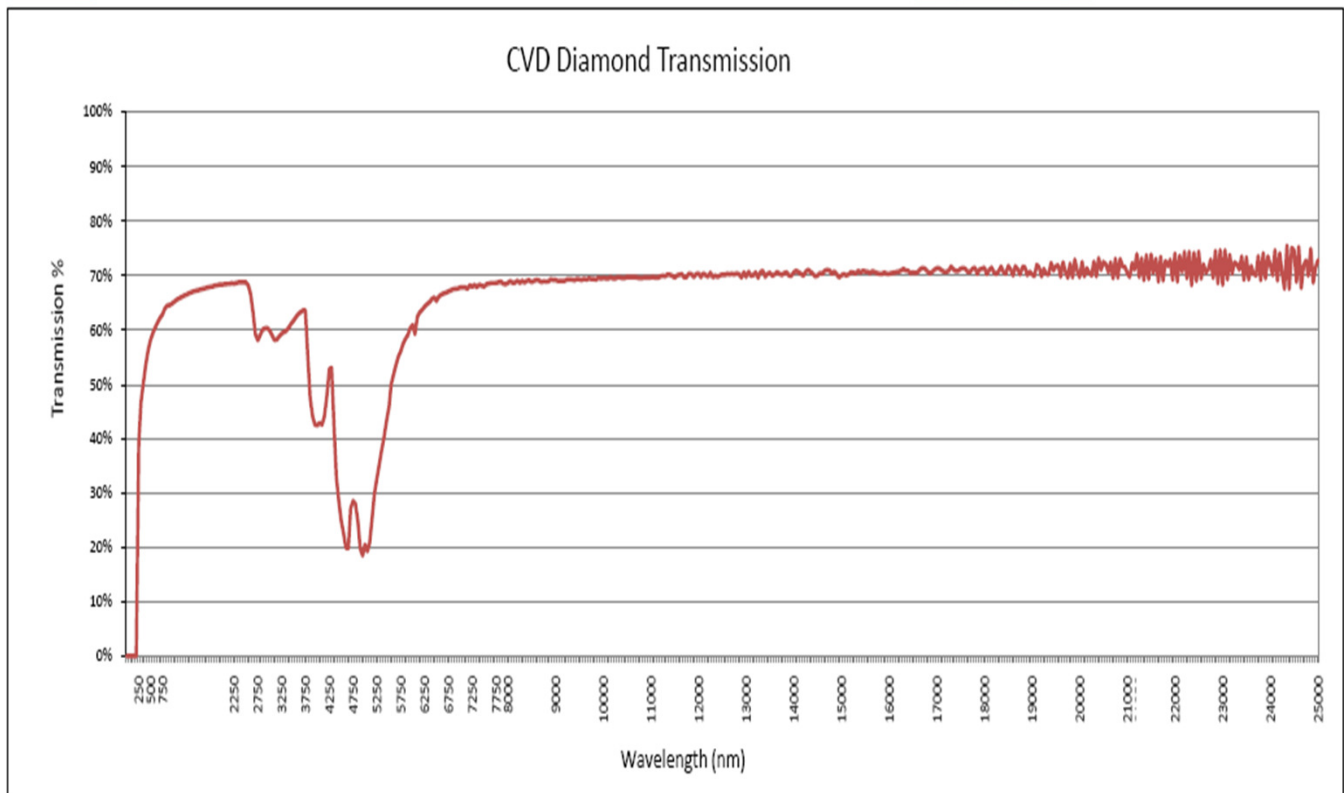
The diamond fluorescence detector is performing three functions :-

1. As a diagnostic tool for monitoring the beam entering the beam line. A CCD camera is mounted to view the visible light fluorescence from the diamond detector through a suitable viewport. Software can then be used to determine beam position and shape.
2. As the vacuum window between the beam line's vacuum system and the vacuum system of the synchrotron storage ring.
3. As a filter to filter out the lower energy X-ray photons from the beam and reduce the downstream heat load. (operating energy range is 50-150 keV, but the Wiggler has a critical energy of 25 keV). The incident power on the detector is 4 kW of which 0.9kW is absorbed. The diamond detector is bonded to a water-cooled copper body to remove the absorbed heat.



Technical Specifications

Detector type	Polycrystalline Diamond FL and OP grades for Fluorescence Detectors and windows.
Detector thickness	Typically from 100micron to 1.1mm.
Detector Size	Range of sizes available to fit application. Typically 20x15 to 80x30mm.
Energy Range	3keV....20keV
UHV Compatible	Yes
Packages	Range of packages available from Oxygen-Free High Conductivity (OFHC) Copper support structure to conflat
Full System Solutions.	Full system solutions including camera's and software available through our partners



OP-Grade Transmission properties