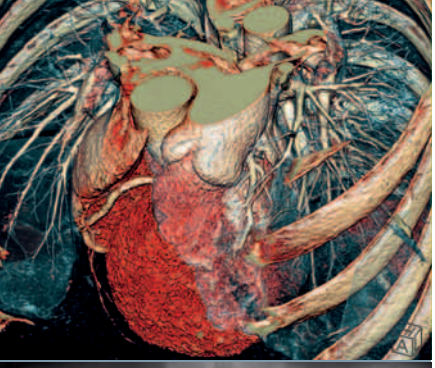
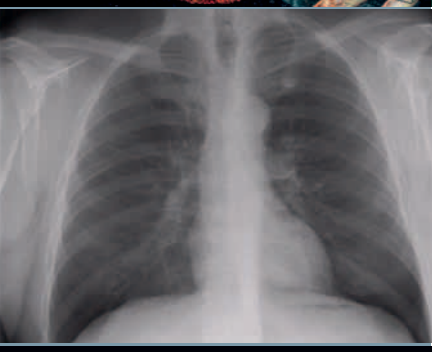
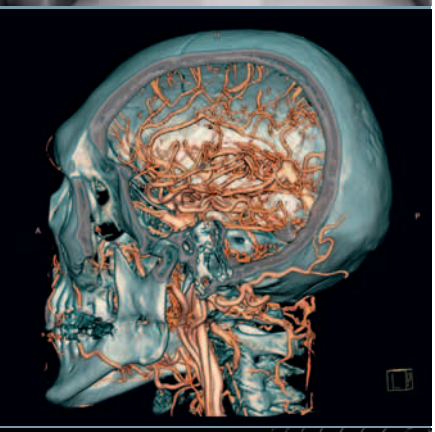
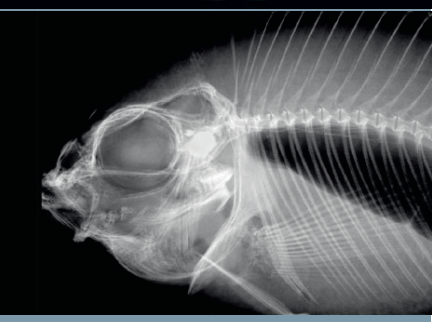








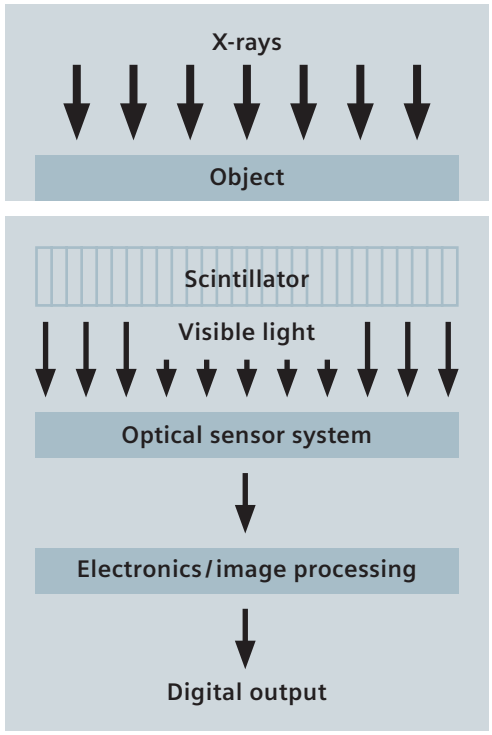
X-ray Scintillators

Solutions for X-ray Conversion

www.siemens.com/vacuumtechnology

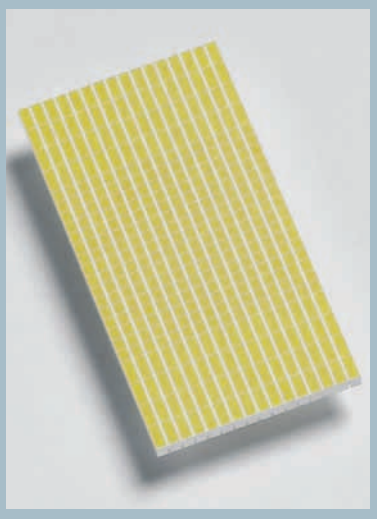
SIEMENS
medical

X-ray Scintillators



Solid Screen
(CsI is grown in needles)

Structured UFC
(slots filled with reflector binder)



Digital X-ray detectors

Most X-ray detectors use a scintillator, which converts the incoming X-rays into visible light. This visible light is then collected by an optical sensor system, which generates an electronic representation of the spatial distribution of the incoming X-ray quanta.

After some further signal processing, a typical modern X-ray detector system provides a digital 2-D or 3-D image.

The scintillator: critical to quality

A good scintillator has to absorb as many X-ray quanta as possible in order to keep the quantum noise as low as possible. This is very important to achieve a good low contrast resolution.

On the other hand, the conspicuity of fine details is important for a good diagnosis. Thus, the lateral light spreading in the conversion layer has to be minimized. For some applications, a high light output is mandatory. The temporal signal behavior, i.e. a fast decay and stability, is important for applications with a high temporal resolution. If image quality is lost during the X-ray conversion process, no electronics or software can restore it.

The scintillator: critical to cost

Detector manufacturers as well as end-users face a tremendous cost pressure. This creates a demand for reliable high-quality scintillators at an affordable price.

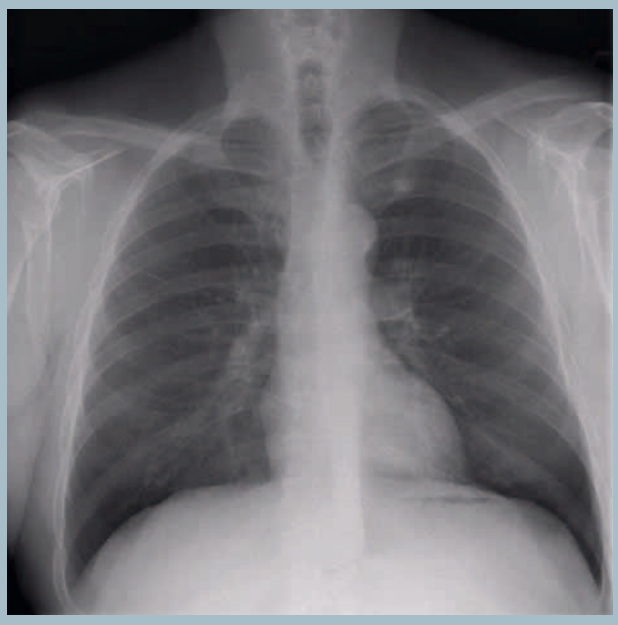
Applications

Our X-ray scintillators can be used in many fields like medical imaging, veterinary medicine, industrial / scientific application, and luggage / cargo screening.

Solutions

Depending on the specific requirements resulting from the intended application, either Solid Screen or Ultra-Fast Ceramic (UFC) products represent the ideal solution for the X-ray conversion process. Whether you put emphasis on high spatial or temporal resolution, one of our scintillator products will be the ideal choice.

Please contact us and we will support you in finding the optimal solution for your X-ray detection system.



Materials and available dimensions

Characteristics	Solid Screen	Ultra-Fast Ceramic (UFC)
Material	Thallium-doped Cesium Iodide (CsI:Tl) in a columnar structure deposited on a substrate	Doped Gadolinium Oxysulfide (GOS) in a polycrystalline structure
Active area	up to 45 cm x 45 cm	Single ceramic plate up to 12 cm x 12 cm
Thickness	up to 600 µm – 800 µm	Crude block up to 30 mm, thickness of slices typically >1.4 mm (more on request)
Smallest pixel size	The spatial resolution of CsI allows pixel sizes ≥ 20 µm in digital detectors	The ceramic can be structured to realize pixel sizes ≥ 400 µm tailored for CT-detectors

Material properties of important scintillators
For the purpose of general orientation only, values may depend on the actual measuring conditions.

Properties / Scintillator materials	CsJ	UFC	$CdW0_4$
Relative light output	130	100	40
Decay time (µs)	0.98	2.5	8.9
Afterglow after 30 ms (ppm)	100	32	160
Drift (120 keV, 15,000 mAs, 60 s)	2 %	0.2 %	0.4 %
Density (g / cm^3)	4.51	7.34	7.9

The Siemens Vacuum Technology Division is ISO 13485:2003/ISO 9001:2000 certified, manufactures in accordance with the Quality System Regulations (QSR) as defined by the Food and Drug Administration (FDA) and endeavors to comply with legal requirements concerning the environmental compatibility of its products. In addition, the performance within the scope set by the guidelines of European Foundation of Quality Management (EFQM) for the European Quality Award (EQA) is continuously monitored.

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