Products for Security and Safeguards Applications
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Radiation detectors play a major role in instruments and systems developed for the security and safeguards markets. Such applications include: nuclide identification, X-ray techniques, such as CT line scanners and portal monitoring at airports, seaports and borders. Saint-Gobain Crystals continues to make a significant contribution working with OEM customers to develop detectors to meet industry specifications. Expert technical support is available to help select or design a detector for specific applications. In this brochure, we summarize the Saint-Gobain Crystals products that have been utilized in this increasingly important market.

Nuclide Identification –

The largest supplier of crystals (primarily, sodium iodide and BrilLanCe scintillators) used for isotopic identification and analysis. Detectors are designed to detect gamma and X-ray radiation from as little as 3 keV to several MeV.

We can assist you in determining if one of our standard detectors will suit your need or whether a custom design is necessary.

Portal Monitoring –

Portal monitors detect the accidental or deliberate transport of radioactive materials on personnel, in vehicles, in cargo containers and baggage. Plastic scintillators are ideally suited for use as primary detectors because they are available in large areas and can identify the presence of radioactive material. Plastic scintillators are non-hygroscopic and provide reliable detector capability for many years.

However, when the application requires isotope identification, NaI(Tl) is a better choice for the primary detectors.

We also manufacture helium-3 neutron proportional counters. Length and sensitivity are easily accommodated. For portal monitoring applications, lengths up to 72” are common.

NeuPort™ is a fully integrated neutron detection solution designed as a replacement for He-3 tubes in Radiation Portal Monitors.

Handheld –

Portable isotope detection is used by first responders or radionuclide identifier at border crossing and shipping containers. NaI(Tl), LaBr₃(Ce) and BGO are the materials used for gamma detection inside the handheld.

He-3 tubes can be added for neutron detection.

A 2x4x16” or 2x4x4” NaI(Tl) detector is coupled to a demountable photomultiplier tube which is available with a variety of termination options.

Our most popular plastic scintillator, BC-408, can be fabricated to meet specialized requirements.
**Container Scanning –**
We have a variety of materials and detector configurations that can be used in container scanning applications.

**Luggage Scanners**
In airports, public buildings, post offices and other security sites, our scintillation arrays mounted on photodiodes are the eyes of the line-scanner systems. Arrays are provided in linear and 2D configurations to your specifications. Materials of choice are CsI(Tl) and CdWO$_4$. Complete assemblies with photodiodes or other light sensors are available for “plug-in.” NaI(Tl) and other scintillators and assemblies are available as well.

**Cargo Scanners**
Saint-Gobain Crystals offers various scintillating crystals, organic scintillators and gas tubes to meet the growing needs of today’s cargo and vehicle scanners. Such scanners are employed at airports, border crossings, customs facilities and freight companies. Detectors are an integral part of systems used for container imaging, manifest verification and contraband identification. Newer, faster scintillators are currently under development which will allow faster scanning to ease the rapidly increasing demand for cargo inspection.

**Applications Matrix –**
As shown by the matrix below, we offer many materials well-suited for safeguard and security applications. We have recently developed manufacturing capabilities for some new materials that you may want to consider for your system. The Lanthanum Bromide scintillators have light output similar to NaI(Tl) but much better energy resolution and decay time. Call for our detailed specification sheets on materials of interest.

<table>
<thead>
<tr>
<th>Material Properties</th>
<th>NaI(Tl)</th>
<th>CsI(Tl)</th>
<th>CdWO$_4$</th>
<th>BGO</th>
<th>LaBr$_3$(Ce)</th>
<th>BC-408</th>
<th>He-3 Tubes</th>
<th>NeuPort$^\text{TM}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density g/cm$^3$</td>
<td>3.67</td>
<td>4.51</td>
<td>8.0</td>
<td>7.13</td>
<td>5.29</td>
<td>1.03</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>PHR@662 keV</td>
<td>7</td>
<td>8</td>
<td>15</td>
<td>10</td>
<td>2.8</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Decay Time (µs)</td>
<td>0.25</td>
<td>1.0</td>
<td>14</td>
<td>0.3</td>
<td>0.016</td>
<td>0.002</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Application**
- Nuclide Identification
- Luggage Scanners
- Cargo Scanners
- Portal Monitoring

**Detector Design –**
Before a new detector can be designed properly to fulfill its design goals, it is necessary to carefully define those goals, the environment, and the circumstances of operation. In other words, you must define the system in which the detector is to be used. To define the system, you need to answer the following questions:

*What is to be measured?*
- Radiation type.

*Why measure it?*
- Time, position, number or energy.

*Where is it to be measured?*
- Physical environment.

*How much data is expected?*
- Data rate and volume.

*What are the meaningful parameters?*
- Pulse Height Resolution (PHR)
- Detection area
- Detection efficiency

The difference between designing to meet specifications only and designing to satisfy an application can be compared to a computer program doing what it was programmed to do versus doing what it is expected to do. Contact our customer service department or your local sales representative to discuss your application.

**Our Strengths –**
- Excellent crystal performance
- Superior process control
- Manufacturing integrated from raw material to finished detector
- Various scintillation material alternatives
- Experienced in all techniques from crystal pixellation to curving
- Large production capacity
- Expertise available to respond to customers’ demands
- Unique R & D capabilities
About Saint-Gobain

Saint-Gobain is a global leader in the manufacture and development of engineered materials such as glass, insulation, reinforcements, containers, building materials, ceramics and plastics. The formation of the Crystals Division reflects Saint-Gobain’s commitment to the development of high performance materials.

The Scintillation Products business is a combination of companies that have been prominent in crystal growth or in radiation detection and measurement. Notable names include: Bicron® and Crismatec (inorganic and organic scintillators and detectors); Gamma Laboratories and TGM Detectors (gas-filled radiation detectors).

For additional product literature or information, call customer service at any of our locations or access our website document library – www.crystals.saint-gobain.com. Other radiation detection products available from Saint-Gobain Crystals include:

- Inorganic scintillators including NaI(Tl), BGO, CsI, CdWO₄, LaBr₃, and LYSO scintillators – configured as solids or arrays with or without an integrated photo readout device.
- Plastic scintillators available as rods, blocks, ingots, thick and thin sheets, tubing and spheres.
- Liquid scintillators as detectors or as bulk material.

The data presented in this brochure are believed to be correct but are not guaranteed to be so. Nothing herein shall be construed as suggesting the use of our product in violation of any laws, regulations, or rights of third parties. User should evaluate suitability and safety of product for user’s application. We cannot assume liability for results that user obtains with our products since conditions of use are not under our control.

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