IRUBIS

INNOVATING INFRARED SPECTROSCOPY

PRODUCT BROCHURE
ATR CRYSTALS

January 2019
IRUBIS ATR Crystal

Universal
Basic Single Reflection ATR Crystal

Specialized 1
Low Penetration Depth ATR Crystal

Specialized 2
Signal Enhanced ATR Crystal
Planned release: summer 2019
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Our Crystals are made of silicon. This does not only drastically lower the price, it is also a very robust material.

During the manufacturing process, our sample carriers receive a special micromechanical structuring on the underside. In these prisms a single internal reflection occurs. The advantage of a single bounce ATR is that there is no focusing required.

As the ATR crystals are very thin, the light path is as short as 1 mm. It is therefore possible to access the fingerprint region.
Universal ATR Crystal
As Good as Diamond
Universal ATR Crystal • Technological Innovation

Our Universal ATR Crystal has the same performance as a single bounce diamond crystal and a broad spectral range.

Compared to standard ATR FTIR sample carriers, this crystal is

• cost effective
• extremely robust
• functionalizable
Universal ATR Crystal • Technical Details

- Product type: Single-bounce ATR crystal
- Dimensions: 11 mm x 9 mm x 0.5 mm
- Active ATR surface: 9 mm x 7 mm
- Microstructured underside
- pH-range: 1 to 12
- Material: silicon
- Angle of incidence: 0° - 60°
- Recommended AOI: 20°
Universal ATR Crystal • Spectral Characteristics

The full spectral range including the fingerprint region can be accessed.

The typical cut-off of silicon is avoided by the very thin ATR crystal (0.5 mm).

The penetration depth is comparable to a single bounce diamond ATR at 45°.

The graph shows the absorption of water on the Universal ATR Crystal compared to a standard single reflection diamond ATR crystal.
Universal ATR Crystal • Angle of Incidence

• The AOI can be varied between 0 and 60 degrees.
• 20 degrees is the optimized angle based on the penetration depth.

Additional Information, negligible for standard measurements:
When the infrared beam enters the crystal, the outer AOI gets translated into an inner AOI. You can find a table for calculations on the next page.
**Universal ATR Crystal • Angle of Incidence**

<table>
<thead>
<tr>
<th>Outer AOI</th>
<th>Inner AOI</th>
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<tbody>
<tr>
<td>0</td>
<td>25.55</td>
</tr>
<tr>
<td>5</td>
<td>25.62</td>
</tr>
<tr>
<td>10</td>
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<tr>
<td>15</td>
<td>26.19</td>
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<tr>
<td>20</td>
<td><strong>26.67</strong></td>
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<tr>
<td>25</td>
<td>27.27</td>
</tr>
<tr>
<td>30</td>
<td>27.96</td>
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<tr>
<td>55</td>
<td>32.36</td>
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<tr>
<td>60</td>
<td>33.32</td>
</tr>
</tbody>
</table>

![Graph showing Inner AOI to outer AOI relationship](image)
Universal ATR Crystal • Positioning

- **Orientation:**
To receive ideal results, please insert the crystal so that the beam path is parallel to the longer side of the crystal and the microstructures.

- **Recommended angle of incidence:**
20 degrees.
Universal ATR Crystal • Compatibility

The crystal can be used with standard ATR accessories. Place the sample carrier on the top of your accessory and focus the beam on the underside of the crystal.

The IRUBIS Obsidian Accessory has an AOI of 20 degrees and is optimized for the Single Reflection ATR Crystal.
Universal ATR Crystal • Cleaning Procedure

You can use any cleaning agent. The crystal is not pH sensitive.

Please note: The crystals were manufactured under clean room conditions and cleaned with isopropyl alcohol during packaging. Nevertheless, we recommend that you rely on your own cleaning process for critical applications.
Universal ATR Crystal • Sample Spectra

ethanol in water (water background)

- Platinum ATR (Bruker)
- Basic ATR crystal (IRUBIS)
Universal ATR Crystal • Sample Spectra
Specialized 1
Low Penetration Depth ATR Crystal
Specialized 1 ATR Crystal • Technological Innovation

This crystal has a high angle of incidence and thus a reduced penetration depth.

This version is suitable for various applications such as Surface Enhanced Infrared Absorption Spectroscopy (SEIRAS).
Specialized 1 ATR Crystal • Technical Details

- Product type: Single-bounce ATR crystal
- Dimensions: 11 mm x 9 mm x 0.5 mm
- Active ATR surface: 9 mm x 7 mm
- Microstructured underside
- pH-range: 1 to 12
- Material: silicon

For further information, please see the instructions for our Universal ATR Crystal.
Specialized 1 ATR Crystal • Angle of Incidence

- Recommended outer AOI: 35°
- Corresponding inner AOI: 49°

Please set your accessory to 35° for optimum results.
Specialized 1 ATR Crystal • Positioning

- **Orientation:**
  To receive ideal results, please insert the crystal so that the beam path is parallel to the longer side of the crystal and antiparallel to the microstructures.

- **Recommended outer AOI:** 35°

- **Compatibility:**
  The crystal can be used with standard ATR accessories. Place the sample carrier on the top of your accessory and focus the beam on the underside of the crystal.
Specialized 2
Signal Enhanced ATR Crystal
By adding special microstructures to the surface of our Single Reflection ATR Crystal, we are able to achieve a signal enhancement.

The patent-pending microstructures lead to a better signal-to-noise ratio and enhance the IR signal. The result is a higher absorption and thus more distinct peaks.

Planned release: summer 2019
Specialized 2 ATR Crystal • Innovative Microstructures

- The liquid sample fills the space between the microstructures on the surface.
- Since the structures are smaller than the wavelength, an effective medium is created.
- As a result, the infrared light interacts more intensively with the sample, resulting in higher absorption.
The microstructured surface of the carrier acts like a plasma filter and separates the blood plasma from the blood cells.

Therefore, centrifugation is not required as only the plasma in between the microstructures is being screened by the IR beam.
Specialized 2 ATR Crystal • Sample Spectra
Specialized 2 ATR Crystal • Sample Spectra

![Graph of acetone in water with absorbance on the y-axis and wavenumber on the x-axis. The graph shows two lines: one for 45° single reflection diamond normalised and another for signal-enhanced sample carrier.]
## Pricing

### Universal / Specialized 1

<table>
<thead>
<tr>
<th>Quantity (pcs)</th>
<th>Price per Unit (€)</th>
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<tr>
<td>1–2</td>
<td>75</td>
</tr>
<tr>
<td>3–9</td>
<td>57</td>
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<td>49.50</td>
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<td>&gt; 49</td>
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Please note: The SEIRAS Optimized Crystal comes without the gold layer.

### Specialized 2

<table>
<thead>
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<th>Quantity (pcs)</th>
<th>Price per Unit (€)</th>
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</table>

Prices are displayed without tax and are subject to change.