Incoatec Microfocus Source μS5
Since its introduction in 2006, the Incoatec Microfocus Source μS5 has become the gold standard for low power low maintenance home-lab X-ray sources. The μS5 combines a low power microfocus X-ray sealed tube with dedicated Montel multilayer mirrors and delivers intensities beyond those of traditional rotating anode sources. With more than 800 source world-wide, the μS5 is the market-leading microfocus source for X-ray diffraction applications, such as single crystal diffraction on small molecule and protein crystals as well as small angle scattering.

- Low power microfocus sealed tube
- Air-cooled
- Operated typically at 50 W
- Power load > 5 kV/mm²
- Montel multilayer mirrors
- Available for Cu-Kα, Mo-Kα, Ag-Kα
- Typical intensities – 3 x 10¹⁵ ph/s/mm² (Cu-Kα), – 3 x 10¹⁵ ph/s/mm² (Mo-Kα)
- Single port source

The latest generation of the μS5, the air-cooled μS 3.0 source, consists of the new Incoatec X-ray Tube DT and is the first and only microfocus X-ray source that is designed for X-ray diffraction. Numerous small improvements in the design of the sources, such as optimized take-off angles, and a new mounting concept (Quick-lock principle) for true downstream alignment with swappable optics make the μS 3.0 the most user-friendly, yet most powerful microfocus X-ray source ever.

Incoatec Microfocus Source μS5

<table>
<thead>
<tr>
<th>Source</th>
<th>μS 3.0</th>
<th>μS 2.0</th>
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</thead>
<tbody>
<tr>
<td>Exposure time [s/°]</td>
<td>4 - 12</td>
<td>5 h</td>
</tr>
<tr>
<td>Total time [d]</td>
<td>4 - 12; 5 h</td>
<td></td>
</tr>
<tr>
<td>Max. Resolution [Å]</td>
<td>0.64</td>
<td>0.56</td>
</tr>
<tr>
<td>Data comparison on a medium well diffracting crystal of a compound</td>
<td></td>
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<tr>
<td>Cu-Kα</td>
<td>Mo-Kα</td>
<td></td>
</tr>
<tr>
<td>Exposure time [s/°]</td>
<td>35; 15 h</td>
<td>35; 15 h</td>
</tr>
<tr>
<td>Resolution [Å]</td>
<td>0.71 (0.81 - 0.71)</td>
<td>0.81 (0.90 - 0.81)</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>12.7 (1.7)</td>
<td>25.8 (7.1)</td>
</tr>
<tr>
<td>R1(Mo)</td>
<td>0.04 (10)</td>
<td>0.04 (10)</td>
</tr>
<tr>
<td>wR1(Mo)</td>
<td>0.07 (22)</td>
<td>0.00 (20)</td>
</tr>
</tbody>
</table>

Sample 1: Larger Crystal of Sucrose using Mo Radiation – 4.167(17) Å, b – 13.76(13) Å, c – 19.304(4) Å, T = 100 K, Z = 4, P2₁2₁2₁, C₂₅H₃₁NO₅

Sample 2: Diphenyl-2-one derivative – 8.416(7) Å, a – 19.304(4) Å, T = 100 K, Z = 4, P2₁2₁2₁, C₂₅H₃₁NO₅

Sample 3: Larger Crystal of Cytidine – 5.0742(2) Å, a – 13.929(2) Å, c – 14.714(4) Å, T = 100 K, Z = 4, P2₁2₁2₁, C₉H₁₆N₄O₆

Sample 4: Crystal of a Highly Absorbing Langasite-type (Lanthanum Gallium Silicate) Compound – Z = 1, P2₁

METALLJET X-ray Source

The brilliance of conventional X-ray sources using a solid metal target is limited by the maximum power load that can be applied without melting the anode material. The METALLJET X-ray source technology has overcome this limitation, as it uses molten alloys containing Gallium and Indium as high-speed liquid metal-jet targets instead of fast spinning solid metal targets. Therefore, power loads of more than 100 kW/mm² in a spot size of 20 µm or smaller can be applied, which are an order of magnitude larger than those of modern microfocus rotating anodes.

- High-speed liquid metal-jet target
- Air-cooled
- Operated typically at 200 W
- Power load > 100 kW/mm²
- Synchrotron-class Montel multilayer mirrors
- Available for Ga-Kα (0.51 Å), In-Kα (0.52 Å)
- Typical intensities – 4 x 10¹⁵ ph/s/mm² (Ga-Kα), 5 x 10¹⁵ ph/s/mm² (In-Kα)
- Dual port source

The HELIOS MX mirrors for Ga-Kα (9.3 keV) and In-Kα (24.2 keV) are synchrotron-class optics tailor-made for the METALLJET source for single crystal diffraction applications, optimized to preserve the extreme brightness of the source. They deliver a small and intense X-ray beam that is much brighter than what is currently achieved with microfocus rotating anode sources. As the energy of the Ga-Kα line is close to the Cu-Kα line, the METALLJET using a Gallium rich alloy as target is the source of choice for ultimate performance in the home lab for applications such as protein and pharmaceutical crystallography, as well as small angle scattering.

By using an Indium rich target, the yield from the In-Kα line, which is close to the Ag-Kα line, can be boosted, giving higher performance for structure determination on absorbing materials and for high-pressure experiments using DAC’s. The very short wavelength minimizes the absorption and leads to a compression of the q-space. Compared to Ag-Kα, about 50% more unique data are accessible.

**Calculated precision parameters of the DH lines recorded with the METALLJET, and determination of Cytidine**

**Data statistics and typical diffraction patterns of a small Langasite crystal at low, medium and high resolution, collected with a DH VENTURE 2nd Gen. and the METALLJET source using an In-rich alloy.**