DISCOVER WHAT THE EYE CAN’T SEE

Scientific, high-performance Cameras
Imaging and Spectroscopy from X-ray to NIR
The Science and Business Park
Berlin Adlershof
Compact, cooled cameras for direct, low light level detection

Spectral ranges: NIR, VIS, UV, VUV, XUV, Soft-X Ray, Hard X-Ray

Lowest noise, high dynamic range, flexible operation, extensive software support

Fast spectroscopy detectors, customized cameras
## General specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Sensor formats</strong></td>
<td>1024 × 1024 pixels (13µm pixel size)</td>
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<tr>
<td></td>
<td>2048 × 512 pixels (13.5µm)</td>
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<tr>
<td></td>
<td>1024 × 256 pixels (26µm)</td>
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<tr>
<td></td>
<td>2048 × 2048 pixels (13.5µm)</td>
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<tr>
<td></td>
<td>4096 × 4096 pixels (15µm)</td>
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<tr>
<td><strong>Spectral ranges</strong></td>
<td>X-ray up to 20 keV, XUV, VUV, UV, VIS and NIR</td>
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<tr>
<td><strong>Dynamic Range</strong></td>
<td>16bit / 18bit</td>
</tr>
<tr>
<td><strong>Readout Noise</strong></td>
<td>min. 2.4e⁻, typ. 4e⁻ @500kHz</td>
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<tr>
<td><strong>Readout frequency</strong></td>
<td>250kHz to 3 MHz</td>
</tr>
<tr>
<td><strong>I/O Signals</strong></td>
<td>Sync and Shutter Out, Trigger In</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>USB / Gigabit-Ethernet</td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
<td>Peltier cooling down to -70°C / -90°C</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td>greateyes Vision Software DLL for Windows and Linux</td>
</tr>
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<td></td>
<td>Labview Drivers</td>
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<td>EPICS Driver</td>
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**Industrial Analytics**

**Fundamental research**
CCD detectors for NIR, VIS, UV

- Quantum efficiency up to 95%
- Full-well capacity up to 700000e⁻
- 16 bit Dynamic range
- Single Capture, Video and Burst Mode
- Read noise min. 2.4e⁻
- Flexible binning modes
- Compact design
- Various pixel formats
- Variety of sensor technologies: FI, BI, DD, OE UV, BI UV1, BI UV3
- Different coatings: UV, FI UV, BR, MID, NIR
- More than 20 different camera models available
Selected application:

In vivo Imaging of sentinel lymph node in living rats

- Detection of cancer cells in the lymph nodes of rats
  - Fluorescence labelled dye applied intravenously into rats
  - Emitted fluorescence detected with **GE 1024 1024 DD NIR** and with specific filter
Scientific cameras for VUV, EUV and X-ray imaging and spectroscopy

- Quantum efficiency up to 98%
- Flange choices: CF, ISO-F, KF
- Full-well capacity up to 700000e⁻
- Read noise min. 2.4e⁻
- Switchable gain
- Temperature of sensor and head
- Forced air and/or water cooling
New In-Vacuum CCD cameras:

- Complete stainless steel or aluminium housing
- Vacuum compatibility: $10^{-3}$ to $10^{-8}$ mbar
- Combined electrical/cooling feedthroughs

CCD cameras with vacuum flange:

- Flange choices: CF, ISO-F, KF
- Forced air and/or water cooling
- Read noise min. $2.4e^{-}$
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New Wafer Scale 16.8 Megapixel CCD:
- 4096 × 4112 active pixels
- Gigabit Ethernet interface with TCP/IP
- CF DN160 flange with additional port
- Deep cooling to min. -90°C
- Flexible 4-port readout & binning
Up to 98% quantum efficiencies (QE) in EUV and X-ray range up to 20keV

Over 60% QE between 100eV – 250eV
Selected applications:

EUV & X-ray Imaging and Spectroscopy

- Image of the copper mesh shows 200nm wide imperfections
- EUV/Soft X-ray microscope with GE 2048 2048 BI
- Laser induced plasma source
- Transmission measurement with GE 2048 512 BI UV1

Thickness determination of ultra-thin foils in the EUV spectrum
Customized scientific cameras

- User specific distance and orientation between flange and image focal plane
- Various flange types: e.g. CF DN160 with integrated exhaust tube for UHV applications
- Hermetically sealed cameras with water cooling only
- Special window materials, such as beryllium, aluminium, MgF$_2$
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