

Selection/Satisfaction/Service = The AMT Advantage

XR401: High Sensitivity CMOS Camera

4.0 Megapixel Scientific CMOS

30 Frames per Second Readout

1.3 Electrons per Pixel Readout Noise

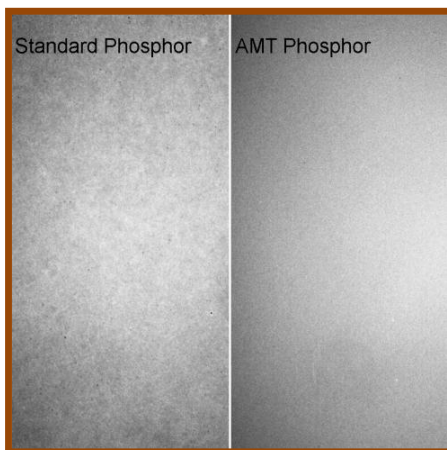
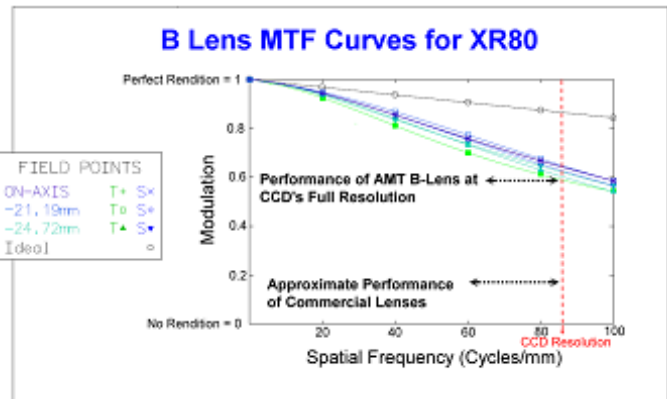
70% Efficiency, Non-blooming Sensor

High Performance CameraLink Interface

The XR401 features a cooled sCMOS sensor that simultaneously achieves high resolution, and fast readout speeds. The sCMOS break through in signal-to-noise means low dose imaging is now possible with this fast and affordable camera. The sCMOS sensor is also non-blooming, which gives it a significant advantage over conventional CCD sensors - especially in diffraction studies. This sensor is combined with AMT's high throughput optics to achieve a new level of speed, sensitivity and dynamic range for both imaging and diffraction.

AMT's lenses combine extraordinary speed with high resolution. This lens maintains both high MTF and high numerical aperture (NA) to provide unmatched sharpness and extremely high sensitivity. This lens also has negligible distortion across the entire field and maintains focus at all corners.

AMT's advanced phosphor and substrate technologies produce brighter images with less structured noise than competing phosphors, while resisting beam damage.



Note that reducing structured noise improves both aesthetics and quantitative data quality. Images shown here are uncorrected.

AMT's software is also well regarded for its efficiency and ease-of-use which help make AMT's system productivity enhancers.

Advanced Microscopy Techniques 242 West Cummings Park, Woburn, MA 01801

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XR401 Rev 1

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Standard XR401 Camera Configurations

- 1) All configurations use AMT high performance B-lens with large 13 μm square pixels at a 26mm x 26mm phosphor.
- 2) Maximum display rate 30 fps @ 1024x1204 pixels (2x2 binning) in standard configuration (graphics display limited). 100 fps option on request.

XR401S-B

Classic Wide Angle Side Mount

100%+ photographic field-of-view imaging (with maximum pixels determined by TEM model).

XR401L-B

High Magnification Bottom Mount

~15% photographic field-of-view imaging with a 26x26 mm phosphor.

XR401M-B

Multi-Discipline Mid-Mount

~30% photographic field-of-view imaging with a 26x26 mm phosphor.

General Specifications

Sensor

- 1) Scientific grade, FL-400 sCMOS sensor with on-chip A/D converters at each column.
- 2) 2048 x 2048 x 6.5 μm pixels with 13x13 mm active area.
- 3) The absolute quantum efficiency is >70% at the output wavelength of the scintillator.
- 4) Maximum readout rate 100 fps at full field and full resolution.
- 5) 1.3 electrons per pixel readout noise at full speed with negligible pattern noise.
- 6) 23000:1 inherent dynamic range with 16-bit readout.
- 7) Greater than 16 bit dynamic range with frame integration.
- 8) Electronic Shutter with no beam blanking or mechanical shutter required with single exposures adjustable from 1 ms to 10 sec.
- 9) High speed CameraLink digital interface.

B-Lens

- 1) Finite-conjugate, color corrected with 0.50x magnification.
- 2) Lens maintains >50% MTF @ 100 line-pairs/mm
- 3) Numerical aperture of 0.23 @image.
- 4) Distortion <1% across the field.
- 5) Telecentric lens design that is compatible with micro-lenses on sCMOS sensor
- 6) All lens components and glass-shielding are melt characterized, are AR coated, and are made with demanding 1/10 to 1/4 wave optical surface flatness.

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Vacuum and Mechanical

- 1) All seals are either static or rotating to avoid possibility of catastrophic vacuum failure.
- 2) All electronics are outside the TEM vacuum.
- 3) Proprietary P43 phosphor and substrate for minimum structured background.
- 4) Phosphor characteristic optimized for kV and application
- 5) Radiation shielding for 200kV standard. Shielding for higher energy systems is available.

Cooling

- 1) The sensor is Peltier cooled to -20° C with a water connection, or to -10° C waterless with fan.
- 2) Sensor is hermetically sealed and outside the TEM vacuum for added reliability.

Software and Computer

- 1) Win7 x 32-bit OS standard and WinXP x 32-bit available (see separate computer specification for more details).
- 2) The software package includes a comprehensive graphical interface for camera operation, image display, and image storage.
- 3) AMT systems communicate with SerialEM, TIA, TEMography, and all modern TEM remote control interfaces when such interfaces are available.
- 4) A more extensive list of operating and analysis functions is available a separate document.

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