

# Rio Camera

## Models 1804, 1809, 1816

Introducing Rio™, Gatan's newest CMOS camera that will revolutionize your transmission electron microscopy (TEM) experience across all applications. With Rio, you no longer have to choose between the field of view, resolution, speed, and sensitivity. With Rio, you get it all. Lens or tapered fiber optic coupled cameras lose most of the light coming from the scintillator. Rio's newly optimized scintillator and 1:1 fiber optic coupling maximize light generation and collection. Rio – the clear new performance benchmark for scintillator cameras up to 200 kV operation.

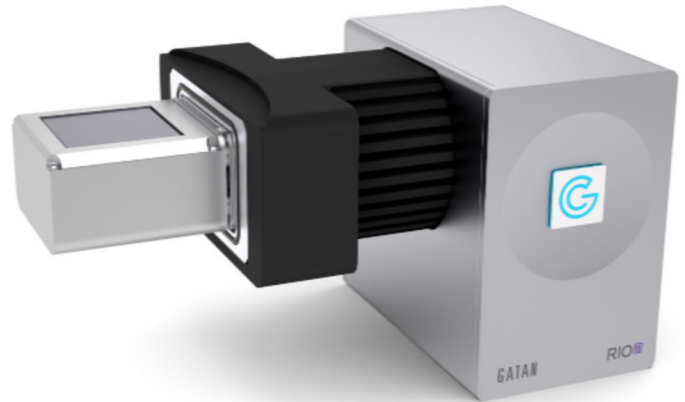
### Benefits

- **High sensitivity:** Newly optimized scintillator and 1:1 fiber optic coupling. Gpixel CMOS sensor with 100% duty cycle and ultra-low readout noise.
- **High resolution:** 9  $\mu\text{m}$  pixel, optimal for 30 – 200 kV operation
- **Large field of view:** Up to 16 megapixels (4k x 4k)
- **High speed:** Up to 20 4k x 4k resolution frames per second and 160 1k x 1k frames per second
- **Easy to use:** Gatan Microscopy Suite® technique panels for simplified experimental interaction
- **Flexible:** Use Rio across many applications, including routine EM, HREM, *in-situ*, diffraction, 4D STEM, and more
- **All Rio cameras come standard** with drift correction and full resolution image display at live frame rates
- **Automatically compensate** for column, holder, or specimen drift when recording images
- **Live, full resolution display:** Eliminates yesterday's need for separate View and Acquire modes, and the full resolution information can be displayed in Fast-Fourier transforms in real-time

With the optional *in-situ* mode, use LookBack post-event trigger to capture high-speed streaming video of events you may have historically missed. LookBack reduces total data storage requirements by allowing you to start the actual video capture after the desired reaction has begun so that you only capture known good video.

In combination with the full *in-situ* control and data handling of the *In-Situ Explorer* module, Rio delivers the temporal and spatial resolution necessary to monitor demanding, high-speed experiments.

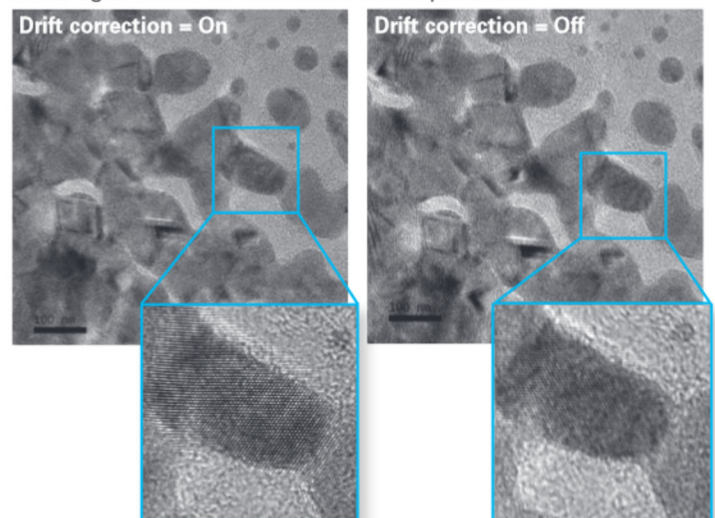
From the moment you open the Rio techniques palette, your complete imaging experience occurs in real-time. This simplified



experience begins a single palette interface that eliminates the need to dig through sub-menus to simply view and acquire an image. As you adjust individual TEM parameters, the live video, full-resolution monitor display lets you immediately see the results on-the-fly.

Not only is the interface easier to use, but it now transitions readily to more demanding applications. When the TruAlign feature is active, you can precisely control the orientation in which objects are displayed with up to 360° rotation. Just align, then snap high-resolution images to the orientation you prefer.

Whether you are acquiring a simple image or defining a complex *in-situ* experiment, the system is so responsive that you will never again settle for less than a live experience.



**Figure 1.** Demonstrates the drift correction capabilities of the Rio camera, and the ability to capture high-quality, 16-megapixel still images and video. Image of gold sample captured with Rio 16 camera; 200 kV; image size: 4k x 4k; exposure time: 1 s.

## Specifications

Camera model	Rio 16	Rio 9	Rio 4
TEM operating voltage (kV)	≤200	≤200	≤120
Sensor active size (mm)	36.9 x 36.9	27.8 x 27.8	18.5 x 18.5
Sensor size (pixels)	4096 x 4096	3072 x 3072	2048 x 2048
Pixel size (µm)	9	9	9
Full sensor read-out speed (fps)	20	15	15
Image display on monitor (fps)	20	15	15
Detective Quantum Efficiency at 0.5 Nyquist, 200 kV (%)	≥6	≥6	≥5
Recording modes	Image Video ( <i>in-situ</i> option)	Image	Image
Image formats	1:1 (4k, 2k, 1k)	1:1 (3k, 1.5k)	1:1 (2k)
Full resolution frame rate, including <i>in-situ</i> for Rio 16 (fps)			
4k x 4k	20	–	–
3k x 3k	–	15	–
2k x 2k	80	–	15
1.5k x 1.5k	–	60	–
1k x 1k	160	–	–
Dynamic range with frame accumulation	≥16-bit	≥16-bit	≥16-bit
Mounting position	Bottom and side, retractable	Bottom and side, retractable	Bottom, non-retractable
GIF compatible	Yes	Yes	No

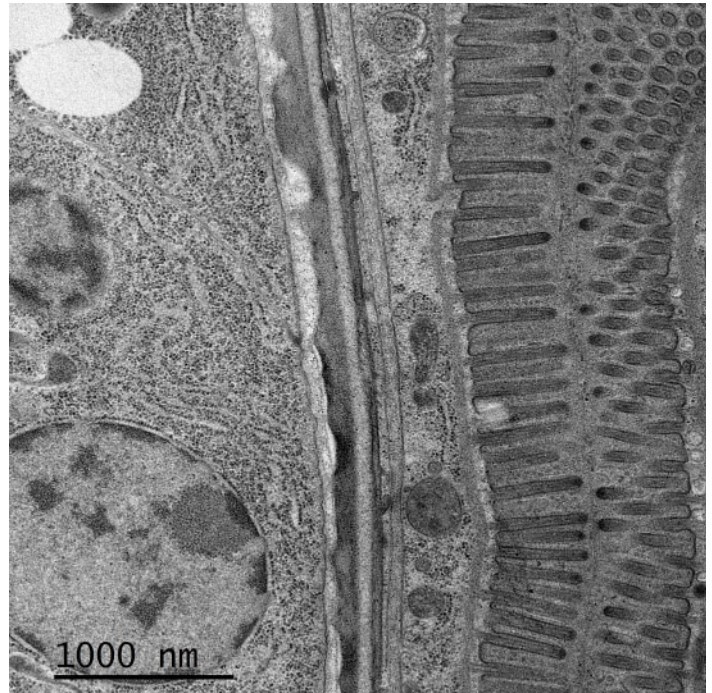
Specifications are subject to change without notice.

## Applications

- Routine EM
- HREM
- *In-situ* microscopy
- High-speed tomography
- Diffraction
- 4D STEM

## Ordering

Model	Description
1816	Rio Camera (16 megapixels, ≤200 kV)
1809	Rio Camera (9 megapixels, ≤200 kV)
1804	Rio Camera (4 megapixels, ≤120 kV)
1816.IS	<i>In-Situ</i> Upgrade for Rio Camera (Rio 16 only)
1000.U2	GEN3 Camera Housing and Flange



**Figure 2.** A high-resolution image of *C. elegans* stomach sample captured with Rio 16 camera; 200 kV; TEM indicated magnification: 6.3kx; image size: 4k x 4k; exposure time: 1 s.

