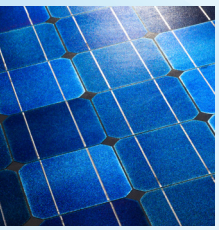
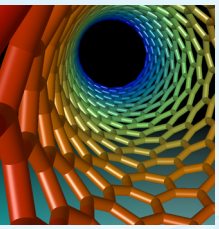
HORIBA Scientific

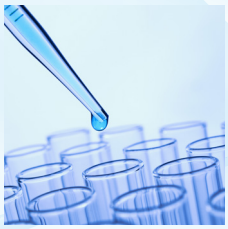


Introducing

Fluorolog-QM

ELEMENTAL ANALYSIS
FLUORESCENCE
GRATINGS & OEM SPECTROMETERS
OPTICAL COMPONENTS
CUSTOM SOLUTIONS
PARTICLE CHARACTERIZATION
RAMAN / AFM-RAMAN / TERS
SPECTROSCOPIC ELLIPSOMETRY
SPR IMAGING





Fluorescence spectrometer combines the best of all worlds

How do you make the best research-grade spectrofluorometer?

By merging the technologies of the market's two premium instruments, along with advances from decades of experience from the industry leader.

HORIBA's new Fluorolog-QM, its fourth generation Fluorolog, features fresh innovations while combining the highly regarded qualities of the Fluorolog®-3 and the PTI QuantaMaster 8000 spectrofluorometers.

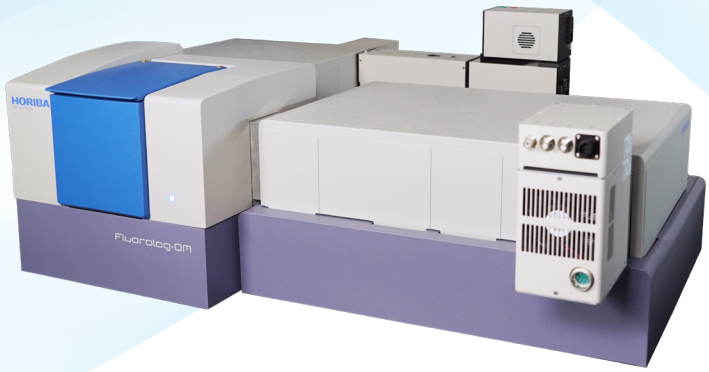
"The Fluorolog-QM delivers the world's highest guaranteed sensitivity specification, improved speed and greater functionality, flexibility, and value," Cary Davies, Global Product Line Manager, Fluorescence Division at HORIBA Scientific said. "The result is superior data quality and capabilities at a familiar price."

Nearly 40,000 published studies cite the Fluorolog family of spectrofluorometers.

What makes the Fluorolog-QM special?

With all-reflective fluorometry, the Fluorolog-QM provides the highest optical performance of any fluorescence instrument. It produces perfect focus at all wavelengths, from the deep UV to the NIR.

"Other instruments use a combination of mirrors and optical lenses," he said. "However the lenses focus different colors of light onto different focal points. This leads to chromatic aberrations and less than optimal performance at varied wavelength ranges. With all-reflective optics, the Fluorolog-QM is always in perfect focus at all wavelengths. That's particularly important these days since more researchers are working from the deep UV all the way out to the near infrared. They want an instrument that provides uncompromised performance across the full spectral range of their experiments."



Fluorolog-QM system configured with a double excitation and a double emission monochromator system and a standard cooled PMT housing

The instrument provides several flexibility features.

"The Fluorolog-QM includes triple grating turrets inside each of its two monochromators, bringing immense flexibility in how you design the instrument," Davies said. *"It gives you the option of selecting up to two additional excitation and emission gratings beyond the standard excitation and emission grating that is included with the system."*

With many optional gratings to select from, you can optimize throughput at different wavelength ranges, enhance resolution, expand wavelength range or improve stray light rejection, depending on your needs.

Other optical design improvements include a much larger monochromator, giving the Fluorolog-QM a longer focal length. That produces better resolution, but more importantly, it produces enhanced stray light rejection.

"The previous Fluorolog-3 had 180 millimeter focal length monochromators," Davies said. "The Fluorolog-QM focal length dramatically increased to 350 millimeters, nearly doubling the distance. And with the optional double monochromators working in an additive mode, the Fluorolog-QM can be equipped with 700 millimeter focal length monochromators on the excitation and or emission channel, offering much better optical performance."

Flexibility goes beyond optical design improvements.

A Fluorolog-QM can be equipped with up to six different detectors all attached to the same system, selected and controlled by Felix FL software. The new acquisition and analysis software, for all steady-state and lifetime experiments, features a recognizable user interface, bundling multiple applications into one seamless suite.

Increased focal length, combined with unique source technology and improved collection optics gives the Fluorolog-QM a significant boost in the sensitivity of the fluorometry.

"That's key, since sensitivity is generally considered the most important attribute of a fluorescence instrument," Davies said.

The Fluorolog-QM's minimum guaranteed sensitivity specification is 32,000:1 for the water Raman spectral measurement using the FSD method, compared to 16,000:1 FSD of the previous Fluorolog-3.

"We've basically doubled the sensitivity from the previous Fluorolog-3," he said.

The Fluorolog-QM features a standard cooled PMT housing. It can operate in four detection modes under software selection:
1. Photon counting steady state
2. TCSPC/MCS lifetimes
3. Single-Shot Transient Digitizer (SSTD)
4. Analog steady state

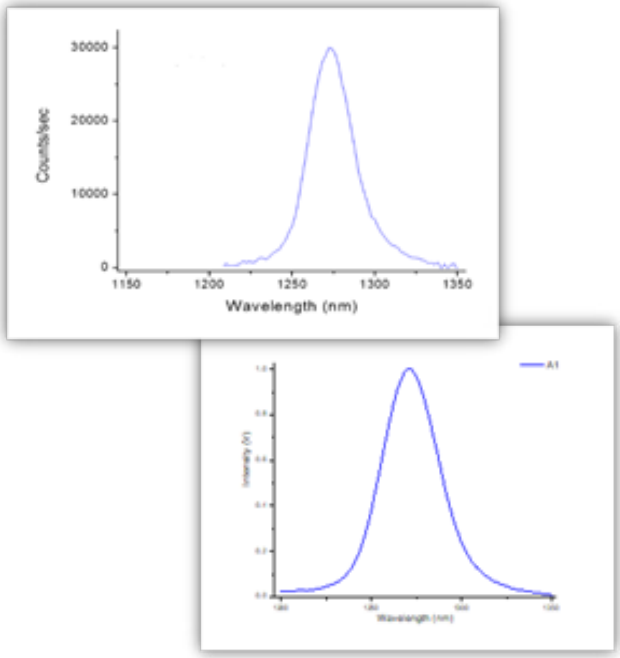
"By simply adding a pulsed light source to a standard Fluorolog-QM, phosphorescence lifetimes can be easily measured, using the standard SSTD mode included with the Fluorolog-QM," he said.

While optional multichannel scaler (MCS) detection electronics can be added for phosphorescence lifetimes, these are not required. The standard SSTD electronics offers unique benefits, including much faster acquisition times and significant improvement of signal-to-noise ratios.

"Perhaps more interesting is that the cost and speed benefits of the SSTD phosphorescence detection of the Fluorolog-QM extend into the near infrared (NIR)," Davies noted. "NIR studies are increasingly popular in fluorescence spectroscopy. However, for a lot of NIR studies, users don't necessarily have to spend $50,000 for an expensive NIR photon-counting PMT detector."

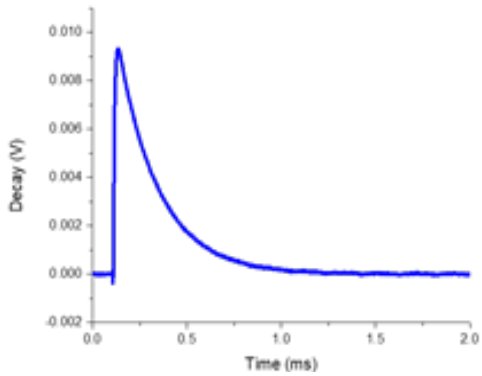
"People have a perception that one of these expensive liquid nitrogen-cooled NIR photon counting PMTs are the best in terms of sensitivity," he said. "But HORIBA has demonstrated that our well-designed IGA detector can be a lot less expensive, and still give you as good or better signal-to-noise ratios for NIR spectra."

Below are NIR spectra of singlet oxygen generated with rose bengal. The spectrum on the left was acquired with a $50,000 photon counting NIR PMT, and the spectrum on the right was acquired with a $10,000 liquid nitrogen cooled IGA detector.



Excellent sensitivity in the NIR with an IGA detector (right) compared to a NIR PMT (left) at a fraction of the cost

"Not only are these solid state NIR detectors an excellent choice for NIR spectra, but with the Fluorolog-QM, you can easily and inexpensively use them for NIR phosphorescence lifetimes," he said. *"You just need to add any TTL-triggered pulsed light source, such as a pulsed xenon lamp, an LED or a laser. No other electronics are required to acquire phosphorescence lifetimes because the standard electronics interface with the Fluorolog-QM includes a Single-Shot Transient Digitizer (SSTD)."*



NIR phosphorescence decay of Nd-doped glass acquired on Fluorolog-QM equipped with liquid nitrogen-cooled IGA detector and pulsed xenon lamp. Emission detection at 1,050 nm.

To acquire high-quality spectra and phosphorescence decays in the NIR region inexpensively is particularly important for rare earth studies. Rare earths are key elements in a variety of important scientific disciplines, including materials research, semiconductors and nanoparticles, photovoltaics, and in biological sciences for rare earth-based sensors.

How does the Fluorolog-QM raise the bar in rare earth studies?

"Most of the rare earths emit in the NIR region and all exhibit long luminescence decays in the microsecond to millisecond time frame, making them ideal for the Fluorolog-QM," he said. "We can collect phosphorescence decay curves in seconds instead of many minutes. And we can get a better NIR quality of data. All of that is done with minimum extra cost."

HORIBA has a proud history in fluorescence.

The Fluorolog-QM is the fourth generation of the world famous Fluorolog, first introduced by Spex Industries in 1975. The HORIBA fluorescence division has spanned the long history of many founding and leading fluorescence companies that are now all part of the HORIBA fluorescence family, including Spex Industries, SLM, Jobin-Yvon, IBH, and Photon Technology International (PTI).

Today, the Fluorolog-QM is one of many fluorescence systems available from HORIBA, all of which take advantage of this extensive heritage of innovation in fluorescence spectroscopy.

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