Powerful Ti:sapphire laser provides efficient excitation

COHERENT

www.coherent.com

The Chameleon Ultra II mode-locked Ti:sapphire laser from Coherent is designed to enable biomedical experiments to be made using a wide range of fluorescent dyes. The laser has more than 3.3 W of output power, which the company says is a 65% increase over previous models. It allows continuous tuning over the 690–1,080-nm spectral range. The ultrafast laser operates at a repetition rate of 80 MHz and emits pulses that have a duration of just 140 fs. The emitted beam is a fundamental transverse mode (TEM_{00}) and has a diameter of 1.2 ± 0.2 mm and an ellipticity of 0.9 to 1.1. Output power noise is specified as less than 0.15% r.m.s. with a stability of better than ±0.5%. The laser includes an onboard spectrometer with USB interface to show the wavelength of operation. Applications include many types of multiphoton excitation microscopy, including coherent anti-Stokes Raman scattering microscopy and three-photon imaging. Coherent says that thanks to its higher output power, the laser provides efficient excitation of long-wavelength fluorophores and enables deeper penetration of light into live tissue.

Fluorescent slides ease calibration

www.nist.gov

Two calibration tools from the National Institute of Standards and Technology (NIST) in the USA can help to correct and optimize the performance of fluorescent spectroscopy equipment used in biomedical applications. Standard Reference Materials (SRMs) 2940 and 2941 are fluorescent glass slides about the size of a pack of chewing gum. Their certified values can be used to calibrate fluorescence emission spectra. By exciting the glass with light at a specified wavelength, researchers can collect fluorescence emission and compare the measured intensity to certified values. Applying suitable correction factors then enables instrument action to be calibrated by modifying spectra to match their correct shape. The SRM 2940 for orange emission has certified values for emission wavelengths from 500 nm to 800 nm when excited with light at 412 nm. The SRM 2941 for green emission has values for wavelengths from 450 nm to 650 nm when excited with 427-nm light. NIST says that the slides are resistant to photodegradation.

Deformable mirrors improve imaging of the eye

www.bostonmicromachines.com

The Mini-DM deformable mirror system from Boston Micromachines now has an increased range of motion (stroke) for better performance in adaptive optics systems used in vision science and microscopy. The advanced wavefront control device is a microelectromechanical system (MEMS) that consists of a deformable mirror membrane driven by an array of actuators. Each actuator can be individually moved with an electrostatic charge to achieve a desired mirror surface shape, enabling improved imaging of the human retina. The enhanced imaging makes it easier to study glaucoma, diabetic retinopathy and macular degeneration, all of which are more common in older people, who tend to have larger optical aberrations that make imaging more difficult. The device also enables researchers using multiphoton microscopy in the lab to look deeper into biological tissue. The device has 32 actuators with 6-μm of stroke and a 2.25-mm aperture. The system includes a USB controller, software and a gimbal mount.

OCT scanner delves deep into tissue

www.md-ltd.co.uk

The EX1301 optical coherence tomography (OCT) microscope from Michaelson Diagnostics of the UK enables the user to see microscopic detail from below the surface of a tissue sample without affecting or damaging it, and with no need for special preparation. The benchtop scanner is designed for laboratory use for examining excised tissue or complete organs. The device performs swept-source frequency-domain optical-coherence tomography, using a high-speed scanning laser with an imaging wavelength of 1,300 nm. It can image to a depth of 2 mm below the surface of a sample, with axial and lateral optical resolutions in tissue of <10 μm. With 5.3-μm pixels, the maximum image width is 6 mm. Images are captured in less than 10 ms, with a 1-Hz image refresh rate. The system provides live image zoom and pan, with a 1.3 megapixel context camera to capture the location of the scan and a visible laser spot for aiming.

Visible laser diodes tackle microscopy and cytometry

www.blueskyresearch.com

The Chromalase II series of visible laser modules from Blue Sky Research of California are designed for chemical and medical applications including flow cytometry, particle sizing and fluorescence microscopy. The systems are compact, single-unit assemblies with integrated drive, control and stabilization electronics. Each consists of a semiconductor laser diode integrated with a microlens, which shapes and corrects the geometry of the light beam. The result is a circular output beam that is free from distortion. A thermoelectric cooler controls the temperature of the diodes to provide stable output power. The modules have wavelength options of 405, 440, 635, 658, 685 and 808 nm with optical output power of 10–100 mW. The series also includes two lasers with wavelengths of 488 nm and 532 nm with optical output power of 10–20 mW.

Metal halide lamp suits fluorescence microscopy

CHROMA

www.chroma.com

The PhotoFluor from Chroma Technology is a high-output light source for use in fluorescence microscopy in biomedical research. It uses a halide metal lamp along with a sputtered, heat-blocking optic to deliver UV and visible light in the wavelength range 340–650 nm. Its high-power UV light enables bright imaging of UV-absorbing fluorochromes, such as DAPI and Hoechst, as well as those requiring longer excitation wavelengths, such as Cy5. The enhanced power of the light source can increase the throughput of light-limited applications, such as spinning-disk confocal microscopy. According to Chroma, the device has minimal need for alignment, and uses a power-management strategy that provides a lamp life of approximately 2,000 hours with minimal decrease in lamp output over time, and reduced fluctuation during experiments. The light source comes with a five-position discrete neutral density filter wheel, plus a display and user interface. It is adaptable to all current standard models of laboratory microscope.