NanoLED

The **reliable** source of ultrashort optical pulses

The NanoLED is an innovative new light source family that uses a variety of light emitting diode (LED) and laser diode (LD) devices to generate picosecond and nanosecond pulses covering the UV to NIR. A wide range of interchangeable NanoLED sources are available, each designed for use over a specific wavelength range and with a specific optical pulse duration.

LED-based sources generate nanosecond pulses in the UV and visible, while LD-based sources generate picosecond or nanosecond pulses in the violet and red. High intensity LD versions are now available for those applications requiring more energy per pulse. All sources operate in conjunction with the same NanoLED controller module described overleaf.

NanoLEDs are ideal sources for fluorescence lifetime and biomedical applications. They are compact, easy to use, and extremely reliable. IBH have been designing fast pulsed light sources since the 1970s and experienced fluorescence lifetime spectroscopists appreciate the quality of the optical pulses produced by the NanoLED system.

Every NanoLED source contains adjustable optics allowing straightforward integration with your optical system. Mechanical coupling is achieved using a quick-release 35mm bayonet-style mounting, which is compatible with Spindler & Hoyer's Microbench optical bread boarding system. An adapter flange is available for existing IBH system users to allow easy coupling of NanoLED sources on to the entrance port of the System 5000 excitation monochromator. Upgrading systems from other manufacturers is simple using our adaptors and support.

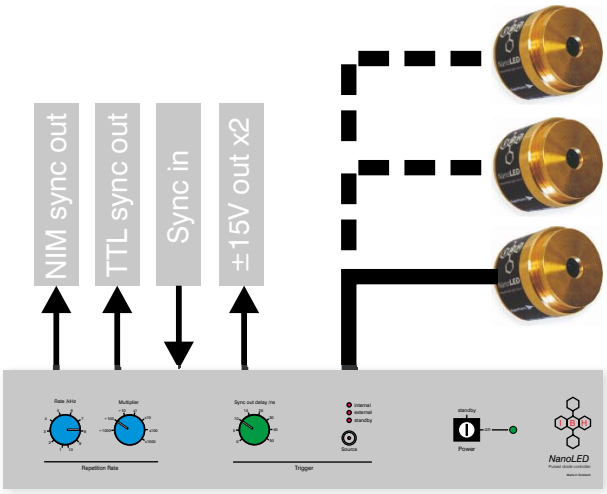
NanoLED sources use the same electromagnetic (RF) suppression technology developed for use in our Mark 4 Nanosecond Flashlamp and feature gold plated casings. Only IBH products offer this level of protection for your data.

Complete low-cost lifetime systems based on the NanoLED and TBX-04 detector are now available. Contact us to discuss your requirements or visit our website for more information.

The NanoLED was granted Millennium Products status by the Design Council in April 1999 and is now included in the Millennium Dome's Spiral of Innovation exhibition in London.

MILLENNIUM PRODUCTS

How does it **work?**



All NanoLED sources (LED and laser) operate in conjunction with the Controller - a rack-mountable module containing power supplies, master oscillator, and synchronisation circuitry. The fast drive electronics are contained inside the sources, allowing each to be optimised independently of the Controller. This ensures that sources can be interchanged, quite literally, in seconds.

The front panel controls include a repetition rate control with continuous adjustment over the range 1Hz to 1MHz, a sync delay control allowing adjustment of sync output relative to the optical pulse (range 0 to 50ns), and selection of sync modes. The Controller can be operated in master or slave sync mode. In master mode the internal master oscillator determines the repetition rate, while in slave mode an external signal determines the repetition rate. Sync outputs are available in both modes of operation, allowing use of the NanoLED in pump-probe arrangements.

The Controller's rear panel includes the drive connector for the sources, sync connections including NIM and TTL outputs, and external input (optocoupled). Two auxiliary ±15V DC power outlets are provided for powering external instruments such as detectors and amplifiers. A drive cable for connection to all NanoLED sources is included with the Controller (2m length).

Typical **applications**

- Fluorescence lifetime spectroscopy
- Testing of optoelectronic devices such as pin-diodes and PMTs
- Replacement of mode-locked lasers in low cost or portable applications
- Detection of molecules labelled with fluorescent dyes
- Biomedical screening & DNA sequencing
- Optical tomography of biological tissue
- Pump-probe measurements

Summary of **features**

1. Sources based on laser diode and LED technology
2. **New UV, violet and blue lasers** now available
3. Extremely reliable - 12 months warranty on all LDs and LEDs
4. Crisp pulse profiles
5. Plug-and-play versatility - sources can be swapped in seconds
6. MHz repetition rate ideal for TCSPC
7. Adjustable optics included as standard
8. Flexible synchronisation - master & slave sync modes with NIM & TTL outs
9. Gold-plated casings for low radiated noise
10. Competitively priced - ultra-fast performance at μs prices

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NanoLED Sources

NanoLEDs represent the best performance to price ratio nanosecond and picosecond light sources available today. Sources have been developed for use with the NanoLED Controller module to cover a wide range of excitation wavelengths and pulse durations.

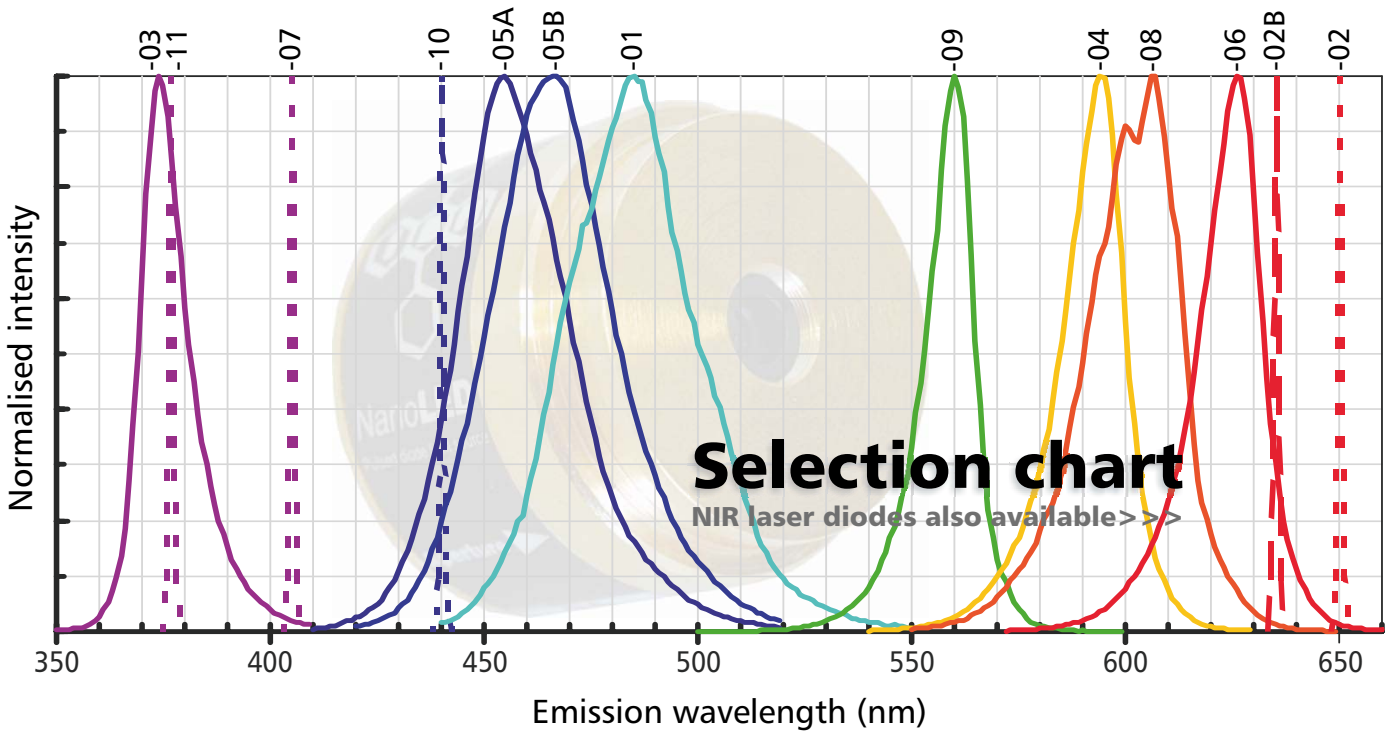
The range includes violet and red picosecond laser diodes, and a selection of low cost LED-based sources. Despite their low cost, these LED sources are high performance quality products featuring superior pulse profiles and gold-plated casings for negligible radio frequency emission. Take a look at the data presented overleaf.

What's more, all sources are fully interchangeable and are supplied with built-in adjustable optics as standard. Laser diode sources contain precision multi-element glass lenses and interchangeable pin-hole apertures allowing beam circularisation. The output beam can be routinely adjusted to obtain collimation or variable focus. The LED sources contain glass aspheric lenses and can also be adjusted to quickly interface with your optical system. Mechanical coupling is achieved using a quick-release 35mm bayonet-style mounting which is compatible with Spindler & Hoyer's Microbench optical bread boarding system.

Our selection chart below will help you choose the most appropriate NanoLED source for your own application. Please note that this is a partial list as additional sources are always under development. If you can't find a NanoLED source to meet your requirements then contact us. We are happy to quote for one-off sources to meet your specifications.

Each source is available in two variants - standard and high intensity. High intensity versions feature more energy per pulse and a longer pulse duration. In the case of our violet and red laser sources the pulse energy can be 100x more while still achieving a clean 1ns optical pulse. We also offer specially selected laser sources for applications requiring <100ps pulse durations.

NanoLED sources operate at a maximum repetition rate of 1MHz. Not only is this an ideal repetition rate for TCSPC applications, but also ensures that the laser or LED is never "over-stressed". NanoLED sources are therefore extremely reliable and can be left running continuously without fear of premature failure. Our standard 12 month warranty applies to all NanoLED sources.

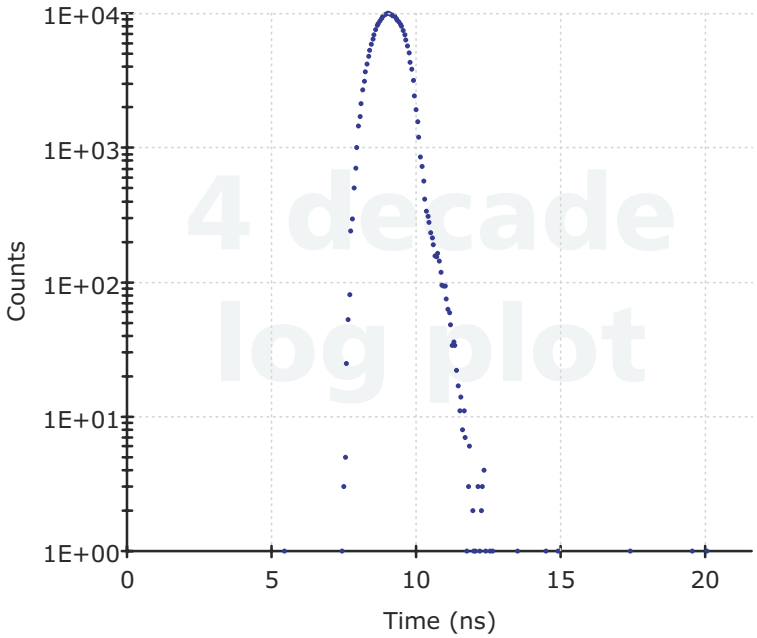


Brief **specifications**

Model	Description	Peak wavelength**	Pulse duration FWHM**
NanoLED-01	Aqua LED	485nm	1.4ns
NanoLED-02	Red laser	650nm	70ps typ. 200ps max*
NanoLED-02B	Red laser	635nm	70ps typ. 200ps max*
NanoLED-02BN	Red laser - high intensity	635nm	1.0ns
NanoLED-03	UV LED	370nm	1.3ns
NanoLED-04	Amber LED	590nm	1.4ns
NanoLED-05A	Blue LED	455nm	0.8ns to 1.4ns
NanoLED-05B	Blue LED	465nm	1.1ns
NanoLED-06	Red LED	625nm	1.3ns
NanoLED-07	Violet laser	405nm	70ps typ. 200ps max*
NanoLED-07N	Violet laser - high intensity	405nm	800ps
NanoLED-08	Orange LED	605nm	1.4ns
NanoLED-09	Green LED	560nm	1.4ns
NanoLED-10	Blue laser	440nm	70ps typ. 200ps max*
NanoLED-11	UV laser	375nm	70ps typ. 200ps max*
NanoLED-12A/B	NIR lasers	785/830nm	70ps typ. 200ps max*

*Guaranteed <100ps versions available **Nominal value

Performance where it counts



Typical LED pulse profile (log plot)

The chart opposite shows the pulse profile of a NanoLED-05A blue LED recorded using an IBH 5000U fluorescence lifetime system. The pulse FWHM is 1.3ns at 450nm.

The pulse profile is presented in logarithmic format to illustrate the crisp pulses generated by the NanoLED system over a wide dynamic range. Note the absence of tail and afterpulses even over four decades. The results of fluorescence decay measurements can be distorted by features on the pulse profile that are invisible when viewed on a linear scale - not so with the NanoLED.

The high quality of NanoLED's pulse profiles makes it the obvious choice for measurements involving samples that are weakly fluorescing, fast decaying or highly scattering.

The chart opposite was created for this brochure using **IBH Plot6 graphics software.**

To obtain more detailed specifications and an updated list of available sources, visit http://www.ibh.co.uk

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