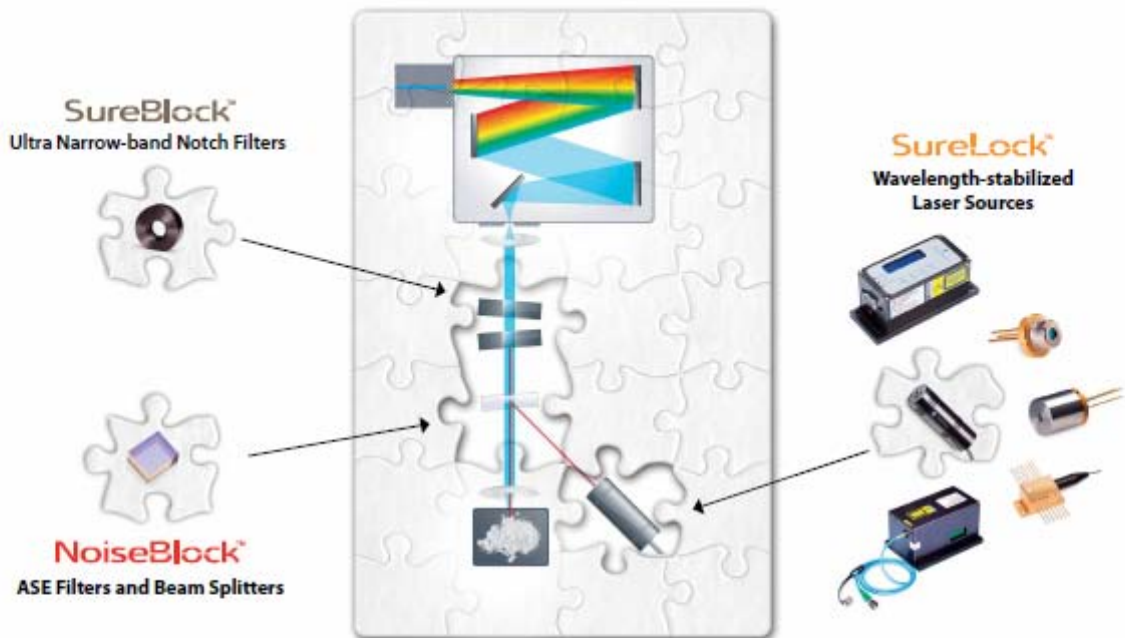


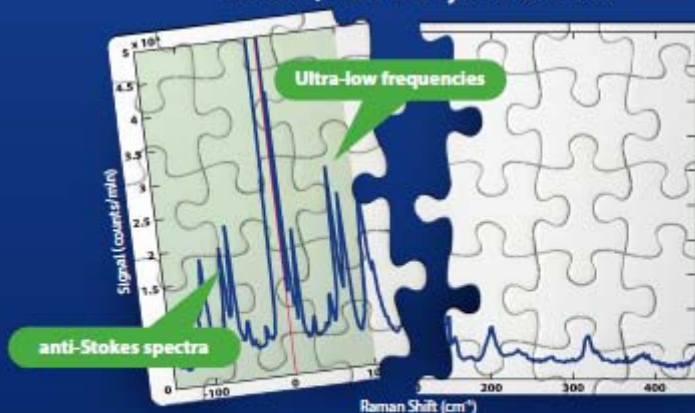
What Pieces Are You Missing?

High Performance Lasers and Filters for Raman Spectroscopy



Triple-stage performance from a single-stage spectrometer

Raman Spectra of L-Cystine @ 785nm



Extending the performance of your Raman System

Ondax wavelength-stabilized lasers and solid-state, Volume Holographic Grating (VHG) notch and ASE filters provide compact, cost-effective solutions that can dramatically improve the overall performance and results you get from your Raman system.

Triple-stage performance from a single-stage spectrometer

Our patented¹ **SureBlock™**, ultra-narrow band notch filters, combined with our **SureLock™** lasers and **NoiseBlock™** ASE filters, can upgrade a single-stage spectrometer to triple-stage performance with higher throughput (fig. 1). Enabling measurements down to below 10 cm^{-1} (fig. 2), this compact configuration provides an inexpensive alternative to cascading spectrometers for capturing low-frequency and anti-Stokes spectra, and can be retrofitted to many existing Raman Instruments.

Measuring these ultra-low frequency Raman signals has never been easier or affordable, opening new discoveries of applications in a variety of research areas, including:

- Folded acoustic modes of multilayer superlattice structures in advanced semiconductor devices
- Vibrations of compounds that contain heavy atoms
- Radial breathing modes (RBM) of single and multi-wall carbon nanotube
- Relaxation modes of various liquids and solutions
- Rotational modes of gases based on bond length

Rugged and Versatile

As standalone components, Ondax lasers and filters are well suited for a wide variety of Raman applications, (including handheld, SERS, SERDS, and TERS). All Ondax VHGs are produced in a proprietary glass designed for long lifetime, high efficiency and excellent optical characteristics, utilizing highly stabilized fabrication processes to ensure excellent part-to-part repeatability.

All Ondax wavelength-stabilized lasers incorporate VHG elements that convert standard laser diodes into stable, high-performance single frequency and line-narrowed Raman sources. Their compact footprint and inherent low power consumption make these ideal sources for both benchtop and portable applications.

SureBlock™ Ultra-narrow-band Notch Filters

Ondax **SureBlock™** ultra narrow-band notch filters are the ideal solution for highly selective wavelength applications like low frequency Raman spectroscopy. With laser line attenuation of up to 99.9999% (optical density: OD 6) and transition width of $\sim 10\text{ cm}^{-1}$ (fig. 3), **SureBlock™** filters can dramatically improve the ability of any Raman system to resolve low frequency Raman scattering. High transmittance on both sides of the notch enables both Stokes and anti-Stokes Raman spectra to be observed simultaneously. Designed to fit into standard 1" optical mounts or available in custom mounting configurations, **SureBlock™** notch filters are designed for long lifetime, high efficiency and excellent transmission. Available in standard wavelengths of 488nm, 514nm, 532nm, 633nm and 785nm. Custom wavelengths from 400nm to 2500nm also available upon request.

Model	488 nm	514 nm	532 nm	632.8 nm	785 nm
FWHM (50%) Notch Bandwidth	0.4 nm 16 cm^{-1}	0.45 nm 16 cm^{-1}	0.45 nm 16 cm^{-1}	0.6 nm 15 cm^{-1}	0.8 nm 13 cm^{-1}
Optical Density @ Laser Line	>4	>4	>4	>4	>4
Transmission Efficiency (%)	60%	65%	70%	80%	90%

¹ US Patent 7,986,407

² Data taken using Ondax SureBlock™ notch filters and a single-stage Princeton Instruments Spectro Pro 23001 at 785 nm

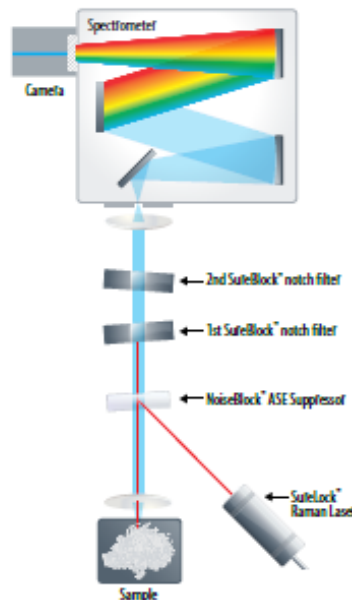


Fig. 1 Compact Low-Frequency Raman System

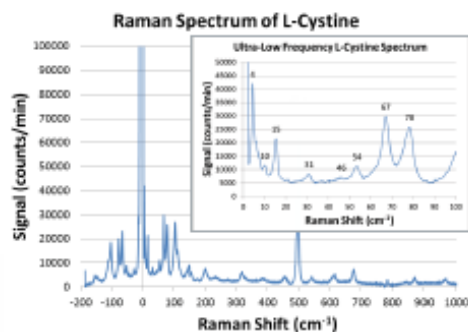


Fig. 2 Raman spectra² of L-cystine at 785 nm

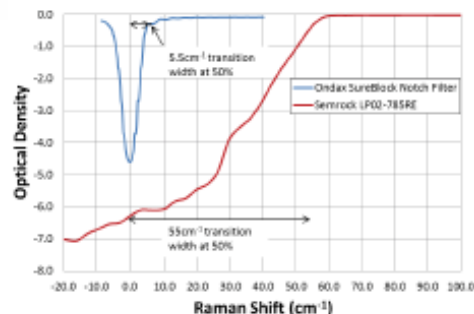


Fig. 3 SureBlock™ wavelength selectivity at 785 nm compared to a thin-film edge filter shows 10x improvement in resolution

Model	Center Wavelength								
	405	640	658	685	690	780.25	785	808	830
TO		9mW	35mW	45mW	45mW	80mW	80mW	170mW	200mW
CP	12mW 40mW						500mW NB*		
RO		7mW	30mW	40mW	40mW	75mW	75mW	150mW	180mW
LM	12mW 40mW	8mW	30mW	40mW	40mW	75mW	75mW	150mW	180mW
FCLM (SM/MM)*	6mW 12mW	2.7mW 5.4mW	10mW 20mW	13mW 27mW	13mW 27mW	25mW 48mW	25mW 48mW	50mW 100mW	
BF							600mW NB*	Custom	

All Powers Single Frequency (Except Where Noted as NB)
 *NB – Narrow Band, SM – SM Fiber, MM – MM Fiber

SureLock™ Wavelength Stabilized Lasers

All SureLock™ wavelength stabilized laser diodes and laser modules incorporate the Onda PowerLocker™ VHG filter to deliver steady, single-frequency or narrowed linewidth spectral performance. Providing stabilized operating characteristics over a broad temperature range and low power consumption, SureLock™ lasers deliver affordable, instrument-quality performance in a wide range of wavelengths, power levels, and form factors:

TO Can – Incorporates the PowerLocker™ VHG directly into a compact, hermetically sealed TO can.

CP Series – Integrates a collimating lens with the PowerLocker™ VHG into an ultra-compact, environmentally stable cylindrical package.

BF 785nm Raman – a high-power 14-pin butterfly package with 100 micron fiber coupled output.

RO Series – Incorporates active TEC cooling and precision control circuitry into a compact, cylindrical package.

LM Series – Includes computer and integrated user interface for precision temperature and current control.

FCLM Series – a fiber-coupled package with cooling, TTL modulation and an analog interface.



Fiber-coupled ASE

Free-space ASE

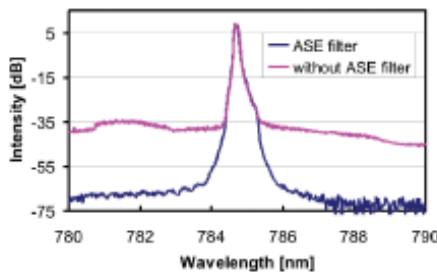
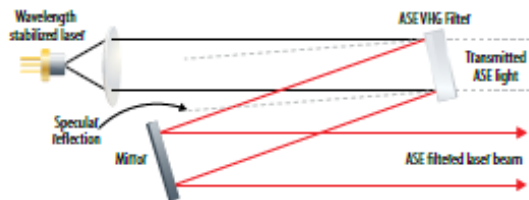


Fig. 4 NoiseBlock™ preserves > 90% of the single frequency line while removing ~ 40dB of ASE

NoiseBlock™ ASE Filters and Beamsplitters

The NoiseBlock™ ASE (Amplified Spontaneous Emission) filters are designed to effectively suppress the broadband ASE spectral background or sideband modes of a single frequency laser by >40dB, to create a pure ASE-free beam (Fig. 4). NoiseBlock™ filters are highly effective at creating the pure spectral excitation beam required for ultra-low frequency Raman spectroscopy applications, and are designed to match the spectral profile of the notch filter. With >90% efficiency within the narrow spectral bandwidth of less than 150pm, they can also be used as spectrally selective 90/10 beamsplitters.

Available in both free-space and fiber-coupled configurations from 400nm to 2000+ nm.



Raman Assemblies

Onda can also integrate our lasers and filters into custom-designed subassemblies, including electronics, to match any OEM requirement. From notch filter assemblies to OEM laser platforms, we can design an optimized solution for any application. Call Onda with your requirements.

Over 10 years of Excellence and Innovation



Optimized Design



Ondax is the world's largest manufacturer of high-performance Volume Holographic Grating (VHG) filters and wavelength-stabilized laser sources for industrial, defense, instrumentation and scientific applications. Since our founding in 2000, Ondax has been enabling advancements in high-power diode-pumped, ultrafast, and direct-diode laser performance for customers across the globe. Our proprietary high-volume manufacturing processes and fully automated, wafer-level testing ensure 100% specification conformance across the full aperture of the grating, along with 100% product traceability. And our record of innovative design, collaborative development, rapid prototyping, component quality and reproducibility, and rapidly scalable, high-volume supply has earned us the position of supplier of choice for the world's largest industrial and defense laser companies worldwide.

World-Class Quality



Our state-of-the-art VHGs improve laser diode performance by increasing spectral brightness, locking the emission wavelength, increasing environmental stability, and improving manufacturing yields. For ultra-fast lasers, chirped VHGs reduce the form factor of conventional pulse compressors while enabling higher laser power. And our single-frequency VHG-stabilized diode lasers cover wavelengths from 405nm to 830nm for applications in Raman spectroscopy, biomedical and analytical instrumentation, environmental sensing, metrology, and scientific research.

High-Volume Manufacturing



Ondax's manufacturing and integration facility is located in Monrovia, California within convenient reach of downtown Los Angeles and all Southern California airports.

Visit the Ondax Online Store to find off-the-shelf samples of hundreds of products, available for immediate delivery.



Ondax – Critical capabilities. Cost-effective solutions.
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