

SHBC-TOPAS

Femtosecond Pumped Narrow Bandwidth Optical Parametric Amplifier System



GENERAL DESCRIPTION

Second Harmonic Bandwidth Compressor (SHBC)-TOPAS-400-WL system is a nonlinear optics device devoted for generation of a narrow bandwidth ($3\text{-}10\text{ cm}^{-1}$) continuously wavelength tunable pulse when pumped by a femtosecond to picosecond pulse with bandwidth of $20\text{-}500\text{ cm}^{-1}$. The system is pumped by a fundamental harmonic of femtosecond (picosecond) Ti:sapphire laser amplifiers and continuously covers wavelength range from 470 to 2400 nm. With optional frequency mixer this range can be extended down to

240 nm. The system consists of two units: a second harmonic generator with bandwidth narrowing – SHBC, which produces a narrow bandwidth ($3\text{-}7\text{ cm}^{-1}$) pump pulse and a white-light continuum seed pulse, and a picosecond optical parametric amplifier of white-light TOPAS-400-WL pumped and seeded by SHBC.

The system features high output stability throughout the entire tuning range, high conversion efficiency, nearly bandwidth and diffraction limited output, and full computer control via USB port. It can operate in wide range of pump energies, from 0.3 to 4 millijoule and produce output energies of more than 400 microjoule in the visible.

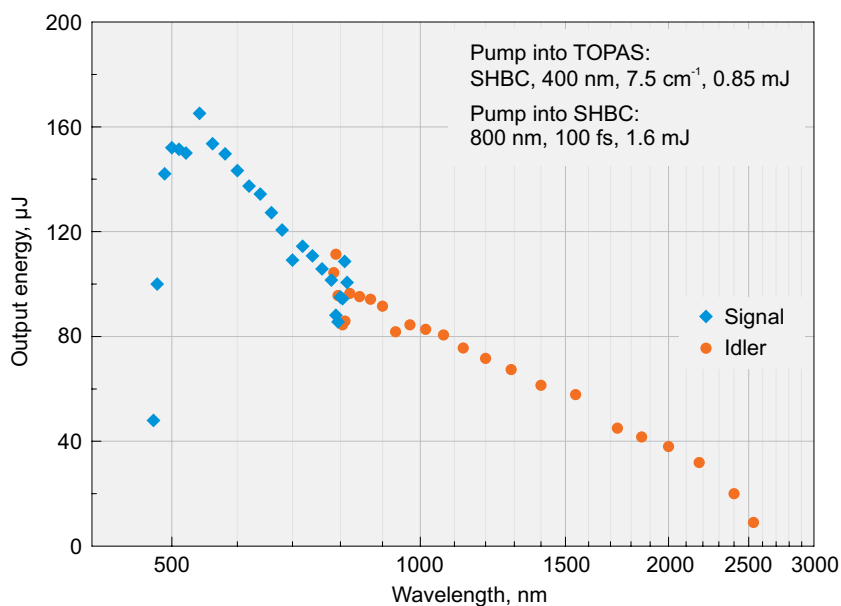
The SHBC-TOPAS-400-WL system is a valuable extension of femtosecond Ti:sapphire amplifiers enabling narrow band Raman spectroscopy measurements. The system, in combination with a femtosecond optical parametric amplifier TOPAS-C, is the first choice tool for single-shot surface sum-frequency spectroscopy, where SHBC-TOPAS-400-WL system provides a continuously wavelength tunable narrow bandwidth visible or UV pulse, and TOPAS-C provides a continuously wavelength tunable broad bandwidth infrared pulse.

FEATURES

- Pulse bandwidth $<10\text{ cm}^{-1}$
- Continuously wavelength tunable in 240-2400 nm range
- High energy output ($>400\text{ }\mu\text{J}$ at peak)
- Nearly bandwidth and diffraction limited output
- High output stability throughout the entire tuning range
- Adaptable to different pump pulse energy, repetition rate and pulse duration
- Full computer control via USB port and dedicated software

APPLICATIONS

- Stimulated Raman spectroscopy
- Surface sum-frequency spectroscopy



Typical tuning curve of SHBC-TOPAS-400-WL

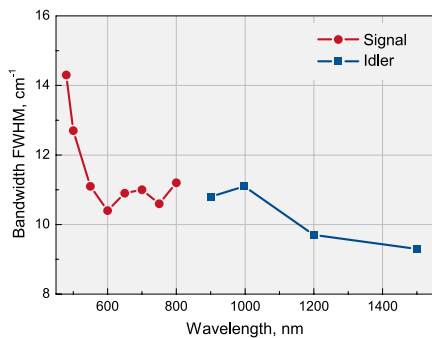
MODELS

Model	Wavelength range
SHBC (without TOPAS)	400 nm
SHBC-TOPAS-400-WL	480–2400 nm
SHBC-TOPAS-400-WL-SH1	290–2400 nm
SHBC-TOPAS-400-WL-SH2	240–2400 nm

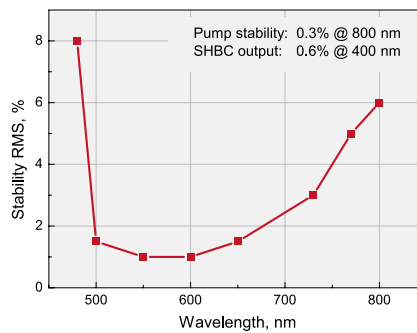
SPECIFICATIONS

SHBC	
Output wavelength	400±10 nm
Conversion efficiency	>25%
Spectral width	<10 cm ⁻¹
TOPAS-400-WL	
Tuning range (Signal + Idler)	480–2400 nm
Conversion efficiency at peak	>20% (of pump from SHBC)
Spectral width	<20 cm ⁻¹ @ 500–730 nm, 870–2400 nm
Time-bandwidth product	<1.2
Energy instability	<6% rms @ 500–700 nm, 900–2000 nm
Signal and Idler Second Harmonic	
Tuning range	240–500 nm
Conversion efficiency at peak	>25% (of Signal)
Spectral width	<25 cm ⁻¹ @ 250–365 nm, 435–500 nm

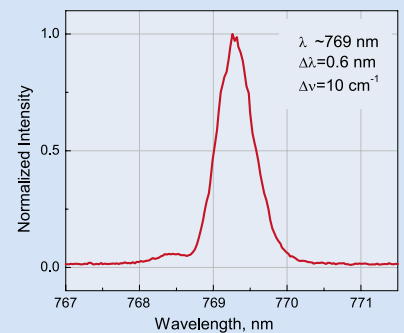
Requirements for the pump laser: wavelength ~800 nm, pump pulse energy 0.3–4 mJ, pulse duration 25–200 fs.



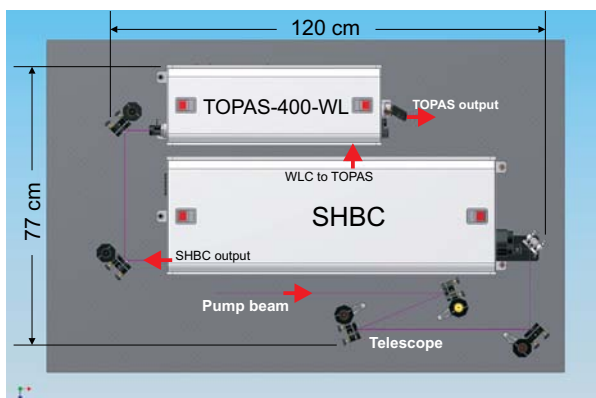
Typical TOPAS-400-WL output pulse spectral width



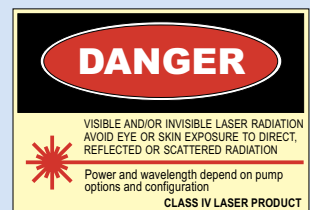
TOPAS-400-WL output stability



Typical TOPAS-400-WL output pulse spectrum



Layout of the system with optional beam reducing telescope.
Minimum required table space shown



Specifications are subject to change without notice.



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