

# TOPAS

## Optical Parametric Amplifiers for Ti:Sapphire Lasers

### FEATURES

- Typical energy conversion into the parametric radiation > 25 – 30% (signal and idler combined)
- Tuning range 1160 – 2600 nm out of a single box (extendable to 189 nm – 20 μm)
- High output stability throughout across the entire tuning range
- Nearly bandwidth and diffraction-limited output
- Passive carrier-envelope phase (CEP) stabilization of the idler (1600 – 2600 nm)
- Computer-controlled operation
- Custom solutions available

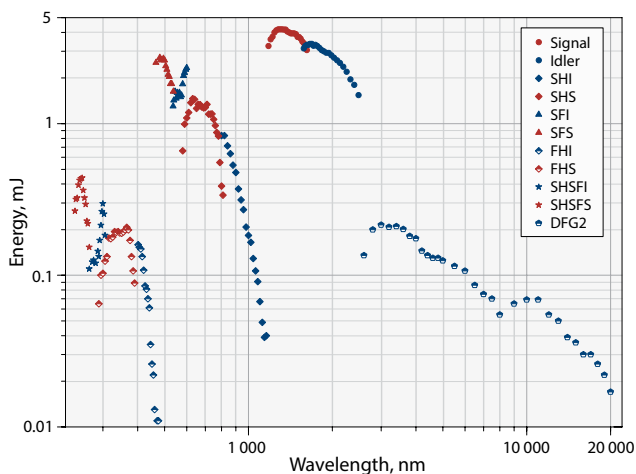
TOPAS is a range of white light seeded femtosecond Optical Parametric Amplifiers (OPA), which can deliver continuous wavelength tunability from 189 nm to 20 μm, high efficiency and full computer control. With more than 1700 units installed worldwide, TOPAS has become an OPA market leader and standard tool for numerous scientific applications. TOPAS can be pumped by Ti:Sapphire amplifiers with pulse duration ranging from 20 fs to 200 fs and pulse energies from 10 μJ up to 60 mJ. Custom solutions beyond given specifications are also available.

# TOPAS | HE-PRIME

## High Energy Optical Parametric Amplifier

### FEATURES

- Pump energy up to 60 mJ
- Energy conversion into the parametric radiation 30 – 50 %
- Tuning range spanning from 189 nm to 20 μm, computer controlled
- High output stability throughout the entire tuning range
- Fresh pump channel improves temporal and spatial properties of sum-frequency options



TOPAS-HE-PRIME tuning curve. Pump: 22 mJ, 45 fs, 805 nm

TOPAS-HE-PRIME is a three-stage optical parametric amplifier of white-light continuum designed for input energies higher than 5 mJ. Over 40% energy conversion efficiency to signal and idler is typically achieved. The system is compact, user-friendly and easily reconfigurable for different pump pulse parameters. Two main versions of TOPAS-HE-PRIME are available: a standard version with input energy of up to 25 mJ @ 100 fs (8 mJ @ 35 fs) and TOPAS-HE-PRIME-PLUS with input energy of up to 60 mJ @ 100 fs (20 mJ @ 35 fs). Additional custom solutions are available, e.g. higher pump energy, temperature-stabilized housing, slow loop idler-CEP stabilisation, etc.

# TOPAS | PRIME

## Collinear Optical Parametric Amplifier

### FEATURES

- Pump energy up to 5 mJ
- Energy conversion into the parametric radiation > 30 %
- Tuning range spanning from 189 nm to 20  $\mu\text{m}$ , computer controlled
- High output stability throughout the entire tuning range
- Fresh pump channel improves temporal and spatial properties of sum-frequency options



TOPAS-PRIME is a two-stage optical parametric amplifier of white-light continuum. TOPAS-PRIME offers high energy conversion efficiency (>30% typically) without compromise in spatial, spectral and temporal qualities of the output. Two main versions of TOPAS-PRIME are available: a standard version with input energy of up to 3.5 mJ @ 35 fs and TOPAS-PRIME-PLUS with increased input energy acceptance of up to 5 mJ @ 35 – 100 fs.

# TOPAS | HR

## High Repetition Rate Optical Parametric Amplifier

### FEATURES

- Repetition rate up to 1 MHz
- Pump energy up to 0.2 mJ
- Tuning range spanning from 290 nm to 2.6  $\mu\text{m}$ , computer controlled
- High output stability throughout the entire tuning range

TOPAS-HR is an optical parametric amplifier designed for high repetition rate (10 kHz – 1 MHz) applications. TOPAS-HR provides high pulse-to-pulse stability throughout the entire tuning range, high output pulse and beam quality, full automation via USB port as well as optional frequency mixing



stages for tuning range extension. TOPAS-HR can be pumped by high repetition rate Ti:Sapphire femtosecond laser amplifiers and is an invaluable tool for spectroscopy, multiphoton microscopy, micro-structuring and other applications.

# TOPAS | TWINS

## Two Independently Tunable Optical Parametric Amplifiers

### FEATURES

- Two independently tunable outputs with single white light seed
- Energy conversion into the parametric radiation > 30 %
- Tuning range spanning from 240 nm to 20  $\mu\text{m}$  in each channel, computer controlled
- High output stability throughout the entire tuning range

TOPAS-TWINS are two independently tunable optical parametric amplifiers (OPAs) integrated into single housing. Both OPAs share the same white light source to provide excellent and bound up stability of both outputs. Shared white light enables the user to generate CEP locked mid-IR pulses in 4.5 – 15  $\mu\text{m}$  range. The maximum pump energy into each OPA depends on the pulse duration; see the specifications for more details. Both OPAs come with wavelength extension options, which can cover the wavelength range from 240 nm to 20  $\mu\text{m}$ . Output specifications for each OPA are the same as of TOPAS-Prime.

## FRESH PUMP OPTION

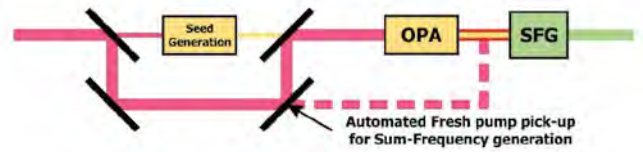
FOR SUM-FREQUENCY GENERATION (SFG) IN RANGE 475 – 580 nm FOR TOPAS-PRIME

### DEPLETED pump option

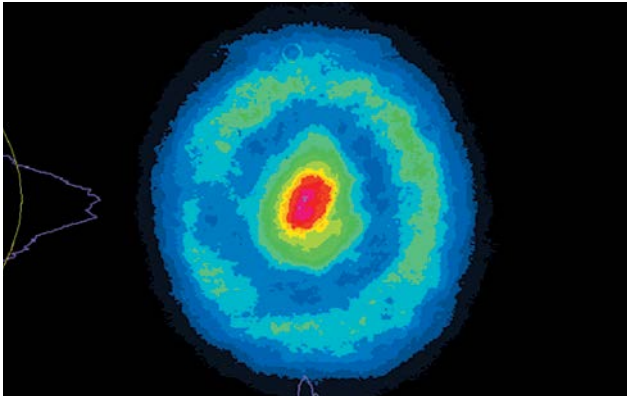


Option when DEPLETED pump is used for SFG

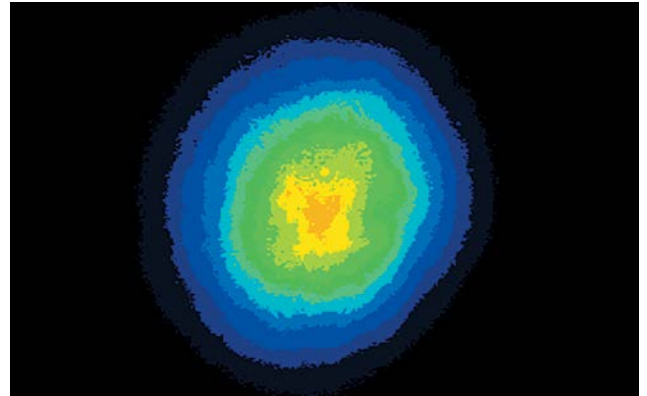
### FRESH pump option



Option when FRESH pump is used for SFG



SF output profile for DEPLETED pump

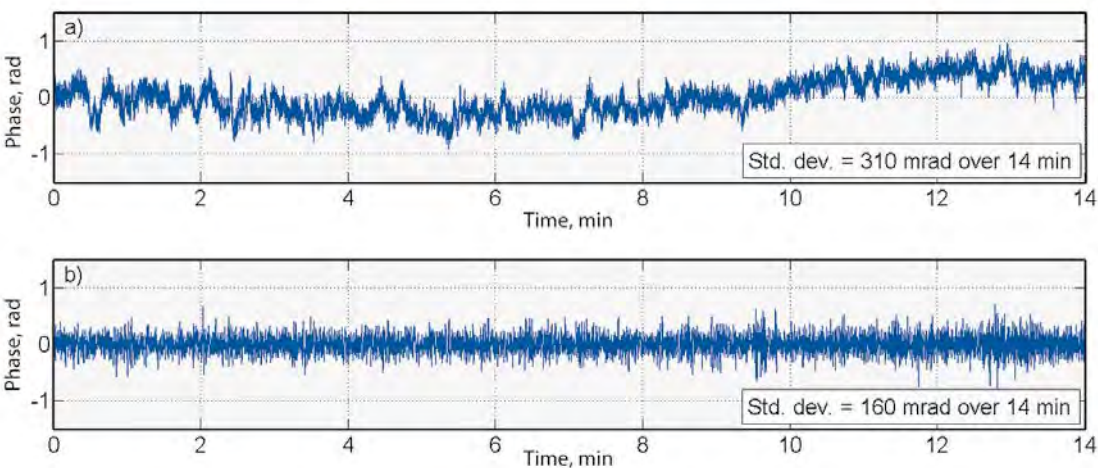


SF output profile for FRESH pump

## IDLER CEP STABILIZATION KIT

TOPAS idler wave (1600 – 2600 nm) is passively CEP locked due to a three-wave parametrical interaction, however, a slow CEP drift caused by changes in pump beam pointing or environmental conditions still persists. Now we are offering a complete solution for CEP registration and slow drift

compensation. Phase correction is performed by employing an f-2f interferometer and a feedback loop controlling temporal delay between seed and pump in power amplification stage of TOPAS-PRIME or TOPAS-HE-PRIME.



Retrieved value and computed standard deviation of the idler CEP over 14 min time range.  
 (a) without compensation of drift, (b) with compensation of drift with a slow loop. Integration time 4 ms (four pulses)