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.

**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 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-Prime**

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.

**HE-TOPAS-Prime**

HE-TOPAS-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 HE-TOPAS-Prime are available: a standard version with input energy of up to 25 mJ @ 100 fs (8 mJ @ 35 fs) and HE-TOPAS-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-HR**

for High Repetition Rate Applications

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 extention. 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.
NirUVIs is an add-on frequency mixer unit for TOPAS-Prime and HE-TOPAS-Prime devices. It consists of three computer controlled nonlinear crystal stages in a monolithic housing. Output is generated by employing a combination of second and fourth harmonic generation as well as sum frequency generation. In comparison with separately standing wavelength mixing stages, NirUVIs offers higher conversion efficiency in certain wavelength ranges, ease of operation, compact design, and low environmental sensitivity. In addition, wavelength separation is added after each nonlinear interaction ensuring high output pulse contrast.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Automated NirUVIs</th>
<th>Standard NirUVIs</th>
<th>NirUVIs-DUV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum wavelength range</td>
<td>240 – 1160 nm</td>
<td>240 – 1160 nm</td>
<td>189 – 1160 nm</td>
</tr>
<tr>
<td>Wavelength tuning automated, except:</td>
<td>Fully automated</td>
<td>Manual change of wavelength separators</td>
<td>Manual change of wavelength separators</td>
</tr>
<tr>
<td>Number of output ports</td>
<td>Single output port for all the wavelengths</td>
<td>4 output ports (wavelength dependent)</td>
<td>4 output ports (wavelength dependent)</td>
</tr>
<tr>
<td>FRESH pump option *</td>
<td>Included</td>
<td>Optional</td>
<td>Included</td>
</tr>
</tbody>
</table>

* see next page for details

**AUTOMATED NirUVIs FEATURES**

- Motorized wavelength tuning and separation – no manual operations
- Single output port for all wavelengths in 240 – 2600 nm range – same position and direction
- Automated polarization rotator for signal beam enables a more consistent output beam polarization for different interactions
- Automated signal dichroic mirror ensures good wavelength contrast ratio of SHI
- Increased conversion efficiency of idler related interactions
- Optical table layout can be U-shaped, L-shaped or in a straight line with respect to TOPAS-Prime

**Typical TOPAS-prime (Fresh Pump option) + NirUVIs output energies when pumped with 1 mJ, 100 fs, 800 nm (SHISM and FHISM energies achieved with separate mixing stages)**

<table>
<thead>
<tr>
<th>Wavelength, nm</th>
<th>Signal</th>
<th>Idler</th>
<th>SH</th>
<th>SHS</th>
<th>SFS</th>
<th>FHI</th>
<th>FHS</th>
<th>SHSFI</th>
<th>SHSFS</th>
<th>SHISM</th>
<th>FHISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>400</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>600</td>
<td>50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>800</td>
<td>75</td>
<td>50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
<td>75</td>
<td>50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

**Background level comparison between NirUVIs and separate mixing stages**

![Background level comparison graph]

![Typical output energy graph]
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

SF output profile for DEPLETED pump

FRESH pump option

Option when FRESH pump is used for SFG

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 persist. 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 HE-TOPAS-Prime.

![Graphs showing CEP stabilization](image)

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)