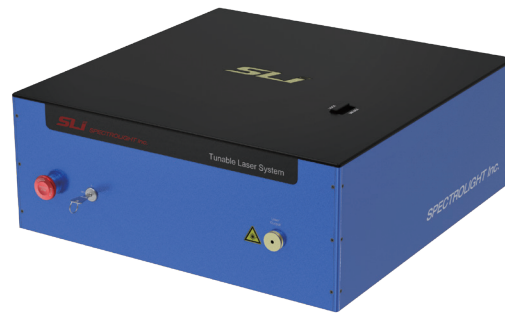


### TLS (Tunable Laser System)

Spectrolight's Tunable Laser System (TLS) revolutionizes spectral imaging by providing a single continuous tunable light source solution covering a wide spectral range from 410 to 1700 nm. This significantly reduces operating costs and simplifies the imaging process by eliminating the need for hyperspectral cameras and individual optical filters.



**TLS-RED** (Tunable bandwidth)



**TLS-BLUE** (Fixed bandwidth)

### TLS Models

| Model name              | TSL10  | TSLM10 | TSLM20  | TSLM40 | TSLM35V | TSL80V   | TSLM70 |
|-------------------------|--|--------|---|--------|---------|----------|--------|
| Model grade             | Entry-Level                                      |        | Mid-Range   |        |         | High-End |        |
| Suggestion Applications | - Light source for TCSPC<br>- Sensor calibration |        | - Fluorescence imaging<br>- Defect Inspection for product |        |         |          |        |

### TLS Benefits

- **Cost-Effective:** Minimizes the need for hyperspectral imaging components.
- **Efficient:** Reduces setup times, increasing operational efficiency.
- **Versatile:** One system covers a wide range of applications.

#### Strong Point!

**Broadband tunability up to SWIR (410 - 1700 nm)**  
- The world's first wide continuous tunable CWL and FWHM

**Wavelength uniformity inside the beam**  
- Uniform wavelength distribution beam

**High output power : > 40 mW (Max, FWHM 10 nm)**  
- Suitable for spectral imaging with wide applications

**High out of band blocking (> 80 dB: OD 10)**  
- Blocking unwanted wavelength up to 1700 nm

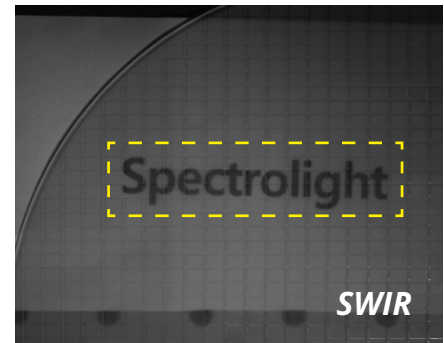
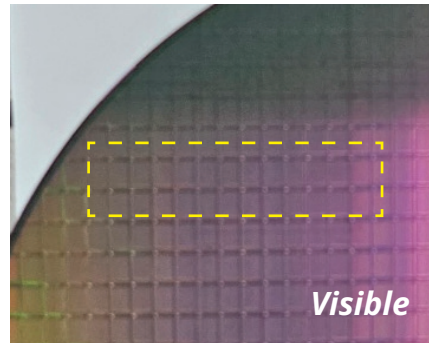
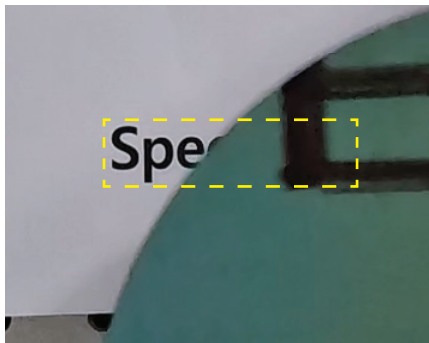
**Bandwidth fixed and adjustable**  
- Fixed (**10, or 20 nm**), Adjustable (**2 - 15 nm**, nominal)

**High pointing stability**  
- No beam position drifts for long distance

**Various models depend on Power**  
- Total Power : **1, 2, 3.5, 4, 7, 8 W** or more

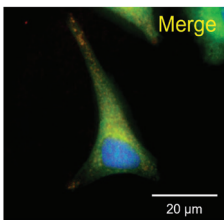
**Various types of repetition rates**  
- Fixed: **5,10,20,40,80 MHz** / Variable: **0.01-200 MHz**

## Application Example *Si wafer inspection*

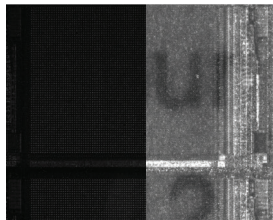


Tunable laser systems (TLS) are a breakthrough in spectral imaging, offering unparalleled flexibility, precision, and cost-effectiveness for a wide range of applications. Acting as a comprehensive and tunable light source, TLS significantly simplifies the imaging process, reducing reliance on multiple expensive instrument adjustments.

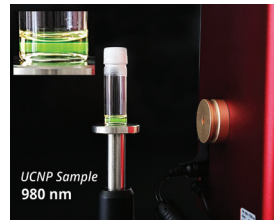
## Application Fields



MEDICAL  
& LIFE SCIENCE



INSPECTION



QUANTUM & NANO  
TECHNOLOGY



NON-DESTRUCTIVE  
TESTING



FORGERY DETECTION

## Experimental setup example

- Ultra broadband Spectroscopic Imaging system including Tunable Laser System



## General Specifications

**Tunable Laser System (TLS) :** Each TLS has VIS, IR, SWIR and Custom wavelength selection

| Model       | Supercontinuum output power |       | Repetition Rate | Output pulse width (ps) | Tuning Range (nm) | Bandwidth (FWHM) (nm)  |
|-------------|-----------------------------|-------|-----------------|-------------------------|-------------------|--|
|             | Visible                     | Total |                 |                         |                   |  |
| TSL10-RED   | 100 mW                      | 1 W   | 5 MHz           | < 300 ps                | 450 - 1700 nm     | <p><b>RED :</b><br/>2 - 15 nm (nominal)</p> <p><b>BLUE :</b><br/>10 or 20 nm fixed (nominal)</p> |
| TSLM10-RED  | 250 mW                      | 1 W   | 10 MHz          | < 50 ps                 | 410 - 1700 nm     |  |
| TSLM20-RED  | 500 mW                      | 2 W   | 20 MHz          | < 50 ps                 | 410 - 1700 nm     |  |
| TSLM40-RED  | 1 W                         | 4 W   | 40 MHz          | < 50 ps                 | 410 - 1700 nm     |  |
| TSLM35V-RED | 1 W                         | 3.5 W | 0.01 to 40 MHz  | < 50 ps                 | 410 - 1700 nm     |  |
| TSL80V-RED  | 1 W                         | 8 W   | 0.01 to 200 MHz | < 300 ps                | 430 - 1700 nm     |  |
| TSLM70-RED  | 2 W                         | 7 W   | 80 MHz          | < 50 ps                 | 410 - 1700 nm     |  |

Users can select a supercontinuum laser model and variable wavelength ranges according to the user's applications for custom model.

## The supercontinuum laser model table

**SL-Pico: Supercontinuum laser**

| Model  | Supercontinuum output power |       | Repetition Rate | Output pulse width (ps) | Spectral Range (nm) |
|--------|-----------------------------|-------|-----------------|-------------------------|---------------------|
|        | Visible                     | Total |                 |                         |                     |
| SL10   | 100 mW                      | 1 W   | 5 MHz           | < 300 ps                | 450 - 2400 nm       |
| SLM10  | 250 mW                      | 1 W   | 10 MHz          | < 50 ps                 | 410 - 2400 nm       |
| SLM20  | 500 mW                      | 2 W   | 20 MHz          | < 50 ps                 | 410 - 2400 nm       |
| SLM40  | 1 W                         | 4 W   | 40 MHz          | < 50 ps                 | 410 - 2400 nm       |
| SLM35V | 1 W                         | 3.5 W | 0.01 to 40 MHz  | < 50 ps                 | 410 - 2400 nm       |
| SL80V  | 1 W                         | 8 W   | 0.01 to 200 MHz | < 300 ps                | 430 - 2400 nm       |
| SLM70  | 2 W                         | 7 W   | 80 MHz          | < 50 ps                 | 410 - 2400 nm       |

## Wavelength range table

User specified custom wavelength range selectable from 410 - 1700 nm (nominal)

|        | FWHM | 2-15                     |           |           |           |           | 3-15      |           | 5-15       |             |             |             | 7-13        |
|--------|------|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-------------|-------------|-------------|-------------|
|        | CWL  | 410 - 435                | 430 - 490 | 485 - 550 | 545 - 620 | 615 - 700 | 690 - 790 | 775 - 890 | 880 - 1015 | 1000 - 1150 | 1140 - 1310 | 1300 - 1500 | 1475 - 1700 |
| RED :  |      |                          |           |           |           |           |           |           |            |             |             |             |             |
|        |      |                          |           |           |           |           |           |           |            |             |             |             |             |
|        | FWHM | Fixed 10 or 20 (nominal) |           |           |           |           |           |           |            |             |             |             |             |
|        | CWL  | 410 - 435                | 430 - 490 | 485 - 550 | 545 - 620 | 615 - 700 | 690 - 790 | 775 - 890 | 880 - 1015 | 1000 - 1150 | 1140 - 1310 | 1300 - 1500 | 1475 - 1700 |
| BLUE : |      |                          |           |           |           |           |           |           |            |             |             |             |             |
|        |      |                          |           |           |           |           |           |           |            |             |             |             |             |

## Full Specifications

|                              |         | TSL10-RED  | TSLM10-RED    | TSLM20-RED    | TSLM40-RED    | TSLM35V-RED               | TSL80V-RED                 | TSLM70-RED    |
|------------------------------|---------|--|---------------|---------------|---------------|---------------------------|----------------------------|---------------|
| Output Power                 | Visible | 100 mW   | 250 mW        | 500 mW        | 1 W           | 1 W                       | 1 W                        | 2 W           |
|                              | Total   | 1 W  | 1 W           | 2 W           | 4 W           | 3.5 W                     | 8 W                        | 7 W           |
| Repetition Rate              |         | 5 MHz  | 10 MHz        | 20 MHz        | 40 MHz        | 0.01 to 40 MHz adjustable | 0.01 to 200 MHz adjustable | 80 MHz        |
| Output pulse width           |         | < 300 ps   | < 50 ps       | < 50 ps       | < 50 ps       | < 50 ps                   | < 300 ps                   | < 50 ps       |
| Tuning range                 |         | 450 - 1700 nm  | 410 - 1700 nm | 410 - 1700 nm | 410 - 1700 nm | 410 - 1700 nm             | 430 - 1700 nm              | 410 - 1700 nm |
| FWHM range                   |         | 2 - 15 nm (nominal)                                      |               |               |               |                           |                            |               |
| Power stability              |         | < 1 %  |               |               |               |                           |                            |               |
| Sync(trigger) Output         |         | (Optional) NIM Output 0 - (-1) V or TTL Output 0 - 3.3 V |               |               |               |                           |                            |               |
| Beam diameter and quality    |         | ~ 2 mm@633 nm; M2<1.1                                    |               |               |               |                           |                            |               |
| Beam divergence (half angle) |         | < 1 mrad   |               |               |               |                           |                            |               |
| State of polarization        |         | Unpolarized  |               |               |               |                           |                            |               |
| Length of output fiber       |         | 1.5 m  |               |               |               |                           |                            |               |
| Software                     |         | TLS ver.2  |               |               |               |                           |                            |               |
| Dimension (L x W x H, mm)    |         | 584.3 x 583.6 x 246                                      |               |               |               |                           |                            |               |
| Input power                  |         | AC 100 - 240 V, 50/60 Hz                                 |               |               |               |                           |                            |               |
| Data interface               |         | USB 2.0  |               |               |               |                           |                            |               |

|                              |         | TSL10-BLUE   | TSLM10-BLUE   | TSLM20-BLUE   | TSLM40-BLUE   | TSLM35V-BLUE              | TSL80V-BLUE                | TSLM70-BLUE   |
|------------------------------|---------|--|---------------|---------------|---------------|---------------------------|----------------------------|---------------|
| Output Power                 | Visible | 100 mW   | 250 mW        | 500 mW        | 1 W           | 1 W                       | 1 W                        | 2 W           |
|                              | Total   | 1 W  | 1 W           | 2 W           | 4 W           | 3.5 W                     | 8 W                        | 7 W           |
| Repetition Rate              |         | 5 MHz  | 10 MHz        | 20 MHz        | 40 MHz        | 0.01 to 40 MHz adjustable | 0.01 to 200 MHz adjustable | 80 MHz        |
| Output pulse width           |         | < 300 ps   | < 50 ps       | < 50 ps       | < 50 ps       | < 50 ps                   | < 300 ps                   | < 50 ps       |
| Tuning range                 |         | 450 - 1700 nm  | 410 - 1700 nm | 410 - 1700 nm | 410 - 1700 nm | 410 - 1700 nm             | 430 - 1700 nm              | 410 - 1700 nm |
| FWHM range                   |         | 10 or 20 nm (fixed) (nominal)                            |               |               |               |                           |                            |               |
| Power stability              |         | < 1 %  |               |               |               |                           |                            |               |
| Sync(trigger) Output         |         | (Optional) NIM Output 0 - (-1) V or TTL Output 0 - 3.3 V |               |               |               |                           |                            |               |
| Beam diameter and quality    |         | ~ 2 mm@633 nm; M2<1.1                                    |               |               |               |                           |                            |               |
| Beam divergence (half angle) |         | < 1 mrad   |               |               |               |                           |                            |               |
| State of polarization        |         | Unpolarized  |               |               |               |                           |                            |               |
| Length of output fiber       |         | 1.5 m  |               |               |               |                           |                            |               |
| Software                     |         | TLS ver.2  |               |               |               |                           |                            |               |
| Dimension (L x W x H, mm)    |         | 584.3 x 583.6 x 246                                      |               |               |               |                           |                            |               |
| Input power                  |         | AC 100 - 240 V, 50/60 Hz                                 |               |               |               |                           |                            |               |
| Data interface               |         | USB 2.0  |               |               |               |                           |                            |               |