



# UPDATES

Bi-monthly updates on the latest in Photonics & Lasers

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[www.zugophotonics.com](http://www.zugophotonics.com)

[enquiry@zugophotonics.com](mailto:enquiry@zugophotonics.com)

## Going Green

### Renewable Energy

With Earth's rapid depletion of natural resources, coupled with climate change concerns and high oil prices, it is little wonder that alternative energy sources like green and natural resources, are now taking center stage.

The green industry has benefitted tremendously from government support in terms of driving renewable energy legislation, increase spending and other forms of incentives and commercialization, and it look poised to weather the 2009 economic crisis better than many other sectors.

Since 2006, 18% of global final energy consumption came from renewable energy such as biomass, hydroelectricity, tidal, wind energy, geothermal, photovoltaic as well as other organic sources such as ethanol.

Leading the pack are the Wind Power and Photovoltaic industries. Wind power is growing at the rate of 30 percent annually, with a worldwide installed capacity of 121,000 megawatts in 2008. The photovoltaic industry annual manufacturing output also reached 6,900 megawatts in 2008, and their popularity is apparent in countries like Germany, Spain and USA.

Countries in Asia are also actively participating in this trend towards going green. About 16 percent of China's electricity came from renewable sources and investment in renewables is now part of the country's economic stimulus strategy. Singapore and many Southeast Asian countries are also investing in the renewable energy field as doing their part for the environment and a means of ensuring energy security in time to come.

Having fifteen years of experience in the photonics market, Zugo Photonics is drawing on our past experience and investing our resources to further enhance our expertise in the green industries. Current capabilities include Test & Measurement instruments for the wind turbine industry, solar simulation for the PV industry, and turn-key laser systems for the manufacturers.

"A person is only as big as the  
dream he dare to live"

## Newport, New Focus

**Newport Corporation** has acquired Oclaro's **New Focus** business, comprising of a portfolio of high-performance photonics products that include opto-electronics, high resolution actuators, opto-mechanics, tunable lasers, vacuum and ultraclean solutions, and OEM-engineered solutions.

The strategic move will further enhance Newport's position as the global leader of advanced technological products and provides greater product variety to its already well established repertoire.

**Zugo Photonics** welcome the new partnership and we look forward to continue and develop successful working relationships with Newport and New Focus.

## New Partners

Forward looking and always placing customers' needs close to our heart, **Zugo Photonics** has constantly been on the quest to source for new products to complement and expand our current product range.

The partnership with **AIST-NT** and **TK Instruments** will further strengthen our product portfolio in the field of Scanning Probe Microscopy and Terahertz Instruments and we believe that the sharing of their expertise in their respective fields will be beneficial to our customers who are carrying out their work in these areas.



With over 15 years experience in combined AFM/SPM/Raman

Spectroscopy, **AIST-NT** main focus is on the innovative research and development of advanced integrated scanning systems for nanotechnology.

Besides the most progressive engineering in the field which includes customizing devices for OEM customers, outsourcing and R&D in nanotechnology, **AIST-NT** offers the highest quality service and customer support.



Based within the Physics Department of Cardiff University, **TK Instruments** develops Terahertz Instrumentation, covering a frequency range from Microwaves to the Far Infrared.

The company also has cryogenic detectors and Quasi-optical systems operating in areas as diverse as atmospheric remote sensing, astronomy, semiconductor materials characterization; Plasma fusion diagnostics and electron spin resonance spectroscopy.

## Important Notice!

As our fiscal year is drawing close, we will like to invite you to write in to us for any contribution or sponsorship of conferences, workshops or corporate events\* in **2010**. Please do so before **6th November 2009**.

For more information, please contact us at 6844 0055 or email us at [enquiry@zugophotonics.com](mailto:enquiry@zugophotonics.com).

\* Agreement of sponsorship or contribution will be at the discretion of the company.



### Infraspection 2009

*Infraspection Institute Level 1 Certification Course*

The 5-day intensive course has seen the participants going through a series of theoretical and hands-on session where they have learnt how to collect quality data, accurate temperature readings and account for measurement effects such as distance and emissivity using infrared cameras.

Costly mistakes such as fire from undetected hotspots can be avoided as the participants learn to distinguish between hot spots and reflections, direct versus indirect readings as well as qualitative versus quantitative thermography.

## 24 – 28 Aug

### Uncovering Biological Phenomenon at Evanescence

No.11 Biopolis Way, #01-02  
Helios Building

## 7 Aug

The seminar on "**Uncovering Biological Phenomenon at Evanescence**" will be held in conjunction with the contract renewal signing ceremony of SBIC Nikon Imaging Centre.

**Zugo Photonics** has been a proud sponsor of this initiative for the past 2 years and we are glad to be able to support SBIC Nikon Imaging Centre in its quest to serve the research community in Singapore.

This comprehensive centre houses advanced light microscopy essentials, including our Newport vibration control workstations and Prior motion control motorized stages.



*China International Exhibition Center, Beijing*

ILOPE is the premier exhibition in China showcasing products for Lasers, Optoelectronics, Optics and Sensors.

It serves as a bridge linking suppliers, buyers, experts and technicians from across the globe to enhance the communication of business affairs and exchange of information and views between them.

Having a successful turnout for ILOPE 2008, **Zugo Photonics** will once again be joining 329 exhibitors from Canada, Germany, Italy, France, Japan, UK, USA, Taiwan, South Korea, Israel, Russia, and Hong Kong respectively to take part in this premier event of the year.

Please join us at the event at China International Exhibition Center, Hall 3, Booth **3803**.

## 21 – 23 Oct

## We are 15!

Started in 1994 as a photonics components distributor, **Zugo Photonics** has always been committed to delivering quality products and dedicated services to our customers.



Leveraging on its fifteen years of experience in the photonics and lasers markets, **Zugo Photonics** has built upon itself a strong and deep rooted foundation while continuing to expand into new territories.

Representing 52 leading principals of their fields in 7 offices across 5 countries in Asia, **Zugo Photonics** is clearly the leader amongst the pack and we are poised to take on greater responsibilities and expand our product range to provide more comprehensive services to our customers and principals alike.

We will like to thank our customers and principals for their past support and we will continue to excel in our field to provide you with greater value-add in the next 15 years.

## 5 Sep

Supported by **RSoft Design Group**, NTU's **Network Technology Research Centre (NTRC)** and organized by **Zugo Photonics**, the RSoft End User Meeting serves as an ideal platform for the creators, users and future users to share their experiences and applications with fellow researchers in the fiber optics and network research area.

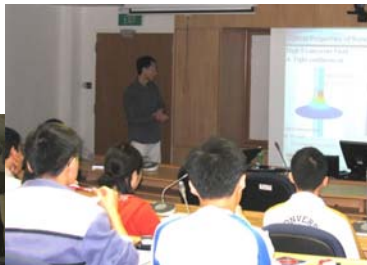


The half day event began with an introduction of RSoft's latest software by Mr Dan Herrman, followed by a series of enlightening presentations by Dr Jason Png from IHPC and Mr Wang Guanghui and Ms Dora Hu from NTRC. Topics that were covered include *Design of Nanostructure Optical Fiber*, *Simulations of Microstructured Optical Fibers*, and *Computer Simulation of a selection of Photonics devices*.

Up and coming software include the **Solar Cell Utility**, which is designed to be used with other RSoft software to simulate solar cell structures with both periodic diffractive optical elements as well as non-periodic diffuse interfaces and the **Tapered Laser (TL) Utility**, which provides an efficient and accurate design tool for analyzing and optimizing tapered semiconductor laser diodes.

Insightful feedback and pointers were also collected and exchanged during the session and we will like to thank the co-organiser NTRC, principal and participants for contributing to this event.

- ▼ Presentation by Dr Jason Png and Mr Wang Guanghui



- ▶ Presentation of a token of appreciation to the speakers.



- ▲ Audiences listening attentively during the seminar

## Special Promotion!

Spectra Physics Centennia Laser going at

**SGD\$45,000**

The Centennia TD laser delivers the ease of operation and reliability of a solid state laser at lower cost, and targets at a wide range of applications including Ti:S pumping for basic applications (such as the 3900S), subtitling of motion pictures, green optical tweezers and laser light shows.

- Diode-pumped solid state CW laser at 532nm.
- 5W of stabilized output power in fundamental mode.
- Noise performance better than 0.4%
- Beam profile with an M2 of better than 1.2.



**Spectra-Physics**  
A Division of Newport Corporation

For more information, please contact us at [enquiry@zugophotonics.com](mailto:enquiry@zugophotonics.com)

# Product Showcase

## Prior Scientific ProScan Scanning Stage

The **ProScan II** is ideally suited for the most demanding imaging applications where high precision and accuracy are essential.

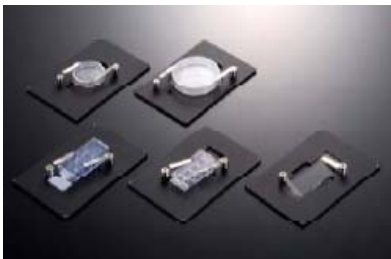
The **HTHE2** family of stages has been designed to incorporate a heating plate and incubator. This heating plate is of sufficient size to ensure a multi-well plate in the incubator is continually and evenly heated.

The **HTHE2** utilises a full range of specimen holders. This enables examination of the widest range of specimen types including glass slides, multi-well plates and petri-dishes.



▲ HTHE2 ProScan Incubator Stage

Clear glass heater prevents condensation formation to Ensure optimum illumination. A definite requirement for time-lapse experiments.



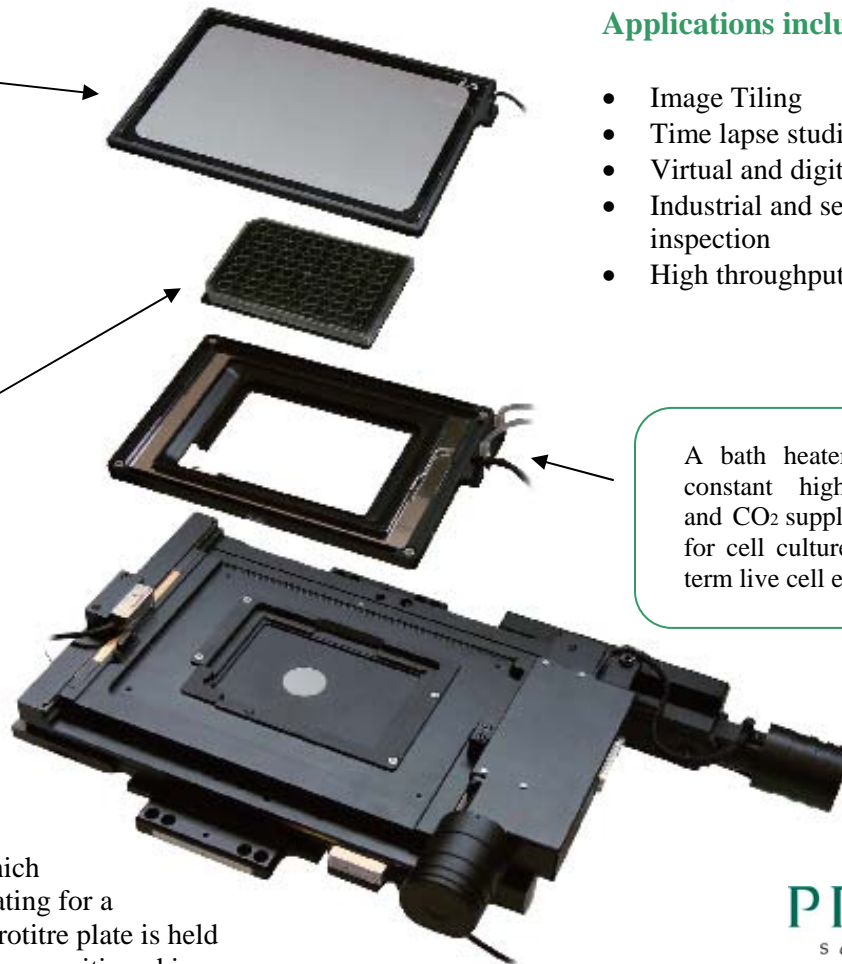
Standard holder for well plates with optional inserts to hold 35-60mm petri dishes, Chamber, and Standard Glass Slides.

### Applications include:

- Image Tiling
- Time lapse studies
- Virtual and digital slides studies
- Industrial and semiconductor inspection
- High throughput screening

A bath heater maintains constant high humidity and CO<sub>2</sub> supply. Essential for cell cultures and long term live cell experiments.

Stage includes a large stage heater, which minimises focus drift and provides heating for a microtitre plate. Every well in the microtitre plate is held at an even temperature wherever they are positioned in a multipoint experiment.



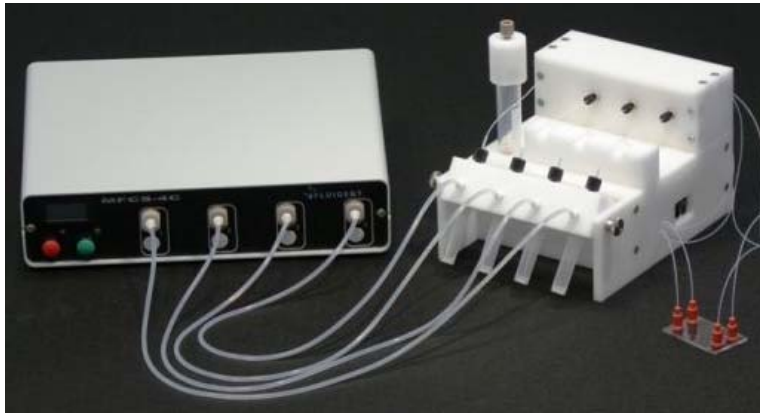
# MAESFLO System

The global solution for high precision microflow control



With up to 8 independent channels and a 40 ms response time, the MAESFLO allows the design, optimization and full automation in a few clicks, of virtually any spatial and temporal flow circulation patterns from sub nL/mn to hundreds of  $\mu\text{L}/\text{mn}$  in complex microchannels architectures.

With the Flowell accessory, you can monitor your flow rate and enslave the MFCS by feedback control.



▲ MAESFLO - Microfluidic Control System and Flowell

## THE FACTS

Current fluid manipulation systems such as syringe, peristaltic or piston pumps are poorly adapted to the manipulation of fluid volumes in the nanoliter range, leading to hysteresis, long equilibration times, irreproducibility and pulsing.

## Specifications

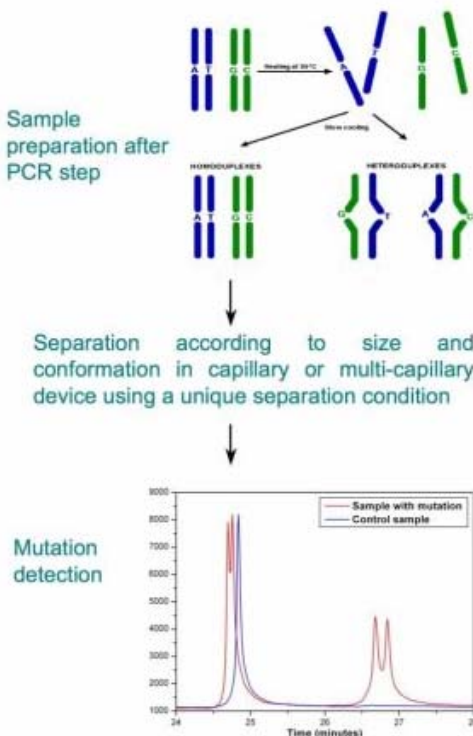
<b>Controlled channels</b>	4
<b>Accuracy/Bias</b>	5.2%
<b>Resolution at min flow</b>	1,8nL/mn
<b>Min. pressure step</b>	25 ubar
<b>Precision/ CV% at 4000nL/mn</b>	0,1%
<b>Flow rate range (bidirectional)</b>	From 1,8nL/mn to 7 $\mu\text{L}/\text{mn}$
<b>Response time</b>	150msec
<b>Wetted material</b>	Glass, PEEK, Polypropylene
<b>Chemical resistance</b>	1M acid and base, EtOH
<b>Weight</b>	2kg

## Applications

- Lab-on-chip &  $\mu\text{TAS}$ -systems
- Micro chemistry
- Rheology study
- Liquid handling in bio-technology
- Micro Emulsion production and control
- Laboratory automation
- Fuel Cells System

# EMMA System

Designed for the detection and discovery of unknown mutations



**Enhanced Mismatch Mutation Analysis (EMMA)** is a mutation detection method alternative to sequencing.

EMMA combines all the advantages of screening before sequencing strategy like high throughput, great reduction of sequencing costs and higher productivity.

The technology is based on Heteroduplex Analysis (HDA) by multi-capillary electrophoresis with an unprecedented sensitivity. It combines sieving and chromatographic effects and is comparable with this of DHPLC or even better, depending on the application.

Other advantages of **EMMA** include

- 1) Diagnosis in the same run, at no extra cost or large scale-rearrangements.
- 2) Saves on the PCR step thanks to size multiplexing.
- 3) Ideal for the detection of unknown mutations for a diagnostic use as well as for new mutations discovery.

## Terahertz 101

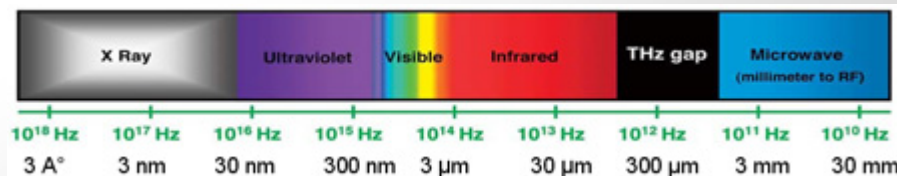
Up till recently, researchers did not extensively explore the applications and interactions in the terahertz spectral region as reliable sources of terahertz radiation are not easily available. However, as continuous wave and pulsed sources become readily available, terahertz wavelength applications are again being pursued by investigators from various fields.

### So what is TeraHertz?

TeraHertz (THz) radiation is a non-invasive form of radiation that lies between the infrared and microwave range of the electromagnetic spectrum. It is defined in the frequency range of 0.01 to 10 THz ( $1\text{THz} = 10^{12}\text{Hz}$ )

Like infrared radiation or microwaves, these waves usually travel in line of sight. Terahertz radiation is non-ionizing submillimeter microwave radiation and shares with microwaves the capability to penetrate a wide variety of non-conducting materials. Terahertz radiation can pass through clothing, paper, cardboard, wood, masonry, plastic and ceramics. It can also penetrate fog and clouds, but cannot penetrate metal or water

### TeraHertz Spectrum



## Importance of TeraHertz and its Applications

- ❖ THz radiation is a safe, accurate, and economical alternative to other scanning methods such as high frequency ultrasound, Magnetic Resonance Imaging (MRI) and near-infrared imaging.
- ❖ Unlike X-rays, TeraHertz radiation is non-ionizing, and thus is not expected to damage tissues and DNA.
- ❖ Terahertz radiation can also detect differences in water content and density of a tissue. Such methods could allow effective detection of epithelial cancer with a safer and less invasive or painful system using imaging.
- ❖ THz exhibits extremely low photon energy so that there is no danger that chemical bonds are broken up and that the examined material is changed.
- ❖ The emitted power is very low leading to insignificant heating.

### Medical Imaging



▲ Skin cancer detection

A few application examples are:

- Disease diagnostics
- Identifying dental caries
- Assessing the magnitude and depth of skin burns
- Cancer detection (e.g skin & breast cancer)
- Determining tissue hydration levels
- 3D imaging of teeth

## Pharmaceutical Applications

- ❖ THz provides both structural and functional information, which makes it an exceptional tool for both spectroscopy and imaging.
- ❖ Spectroscopic THz analysis may also be used in genetic diagnostics, environmental sensing, to help identify explosives, to detect biological agents, to screen pharmaceuticals, and to investigate material characteristics.

T-Rays are ideally suited to act as a monitor to provide additional insight into changes to protein structure and identification of unknown samples.

A few application examples are:

- Polymorph Recognition
- Molecular Recognition
- Protein Folding
- Ingredient Quantification
- Drug Counterfeiting
- Non-destructive Tablet Coating Analysis
- In-line Probing and Quality Assurance
- Drug Stability Test after Manufacture



▲ An Acetaminophen caplet under test

These practical applications would enable pharmacies to have much better control over quality control, statistical process control, and quality assurance, from the manufacturing process through to sample storage conditions.

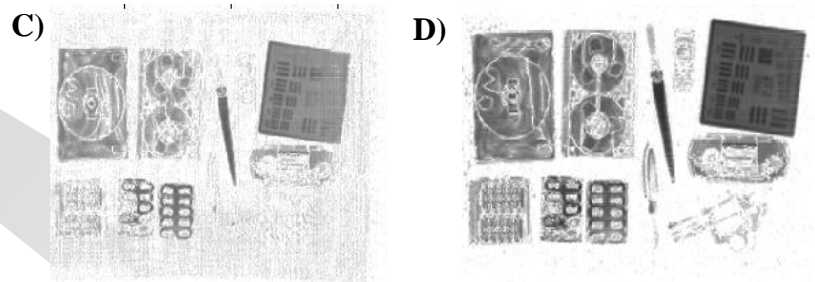
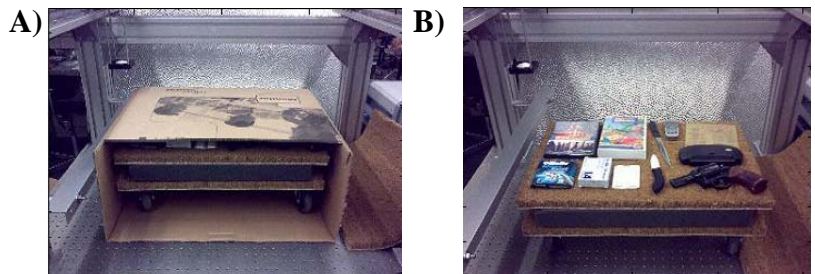
- ❖ THz exhibits unique characteristics not found in other portion of the electromagnetic spectrum.

- ❖ THz can safely penetrate materials such as clothing and plastics to image concealed objects and spot manufacturing flaws.

- ❖ THz radiation can penetrate almost any material except for water and metal. THz imaging often allows a better image quality than subsonic or x-ray imaging, while THz waves are also harmless. In addition, THz allows free-space coupling to the device under test!

- ❖ A few application examples are:
  - Quality Control: Finding Hidden Defects
  - Hidden Surface Characterisation
  - On-line Thickness Control of Coatings
  - Package Inspection
  - Security Screening

## Package Inspection



▲ A & B - Photograph of measurement scene with and without cardboard box.  
C -& D - THz tomographic cross section with and without cardboard box.

## UPDATES

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### PHOTONICS

**AIST-NT**  
Microscopy  
**AA OPTO-ELECTRONIC**  
Optics & Opto-Mechanics  
**ANDOR TECHNOLOGY**  
Imaging Systems  
**CAPACITEC**  
Test & Measurement  
**DENSELIGHT**  
**SEMICONDUCTORS**  
Fiber Optics/ Photonics  
Components, Light Sources  
**DRS DATA & IMAGING SYSTEMS**  
Imaging Systems  
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**FLUIGENT**  
Microfluidics  
**GENTEC-EO**  
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**HAWK IR**  
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Imaging Systems  
**INFRAATEC**  
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**MMR TECHNOLOGIES**  
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**SPECTRA-PHYSICS**  
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Sources, Spectroscopy  
**TK INSTRUMENTS**  
Terahertz Instruments  
**UDT INSTRUMENTS**  
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Imaging Systems  
**WAVEFRONT SCIENCES**  
Test & Measurement  
**WEIYI**  
Fiber Optics/Photonics  
Components

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Laser Electronics  
**EDINBURGH INSTRUMENTS**  
Lasers: Gas  
**KIMMON KOHA**  
Lasers: Gas  
**KORNIC SYSTEMS**  
Semiconductor Equipment  
**LAMBDA PHYSIK**  
Lasers: Excimer  
**LAVISION**  
Intelligent Imaging Systems: PIV &  
LIF Systems  
**LASER S.O.S.**  
Laser Accessories  
**LASERVISION**  
Laser Accessories  
**LITRON LASERS**  
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**NEOCERA**  
Pulsed Laser Deposition: Deposition  
Chambers  
**NUFERN**  
Lasers: Fiber  
**PHOTOP SUWTECH**  
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**POWER TECHNOLOGY**  
Low Power Lasers  
**SACHER LASERTECHNIK**  
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**SPECTRA-PHYSICS**  
Lasers: UltraFast, Nd:YAG, DPSS,  
Gas

### Zugo Photonics Sales Offices

#### SINGAPORE

(Corporate HQ)  
55 Kaki Bukit View  
Kaki Bukit Techpark II  
Singapore 415976  
Republic of Singapore  
T: (65) 6844 0055  
F: (65) 6844 0655

#### BANGKOK

731 PM Tower, 9<sup>th</sup> Fl.,  
Asoke-Dindaeng Rd.,  
Dindaeng,  
Bangkok 10400 Thailand  
T: (662) 640 2955  
F: (662) 640 2958

#### HO CHI MINH

Room 316,  
Duy Tan Plaza,  
10 Ba Thang Hai, Street  
Ward 12, District 10  
Ho Chi Minh Vietnam  
T: (84) 85 404 2748  
F: (84) 85 404 2625

#### SHENZHEN

Room 3902M  
Hongchang Square  
2001 Shennan East Rd  
Luohu District  
Shenzhen  
P.R. China 518 002  
T: (86) 0755 82682155  
F: (86) 0755 82682156

### Zugo Photonics Distributors

#### PHILIPPINES

Lantec Resources, Inc  
5th Fl. Richville  
Corporate Tower  
1107 Alabang-Zapote Rd.  
Madrigal Business Park  
Alabang, Muntinlupa City  
T: (639) 17 5244075  
F: (632) 542 3614

State Alliance Enterprises,  
Inc.  
283 G. De Rivera St.,  
San Nicolas,  
Manila, Philippines  
CPO Box 3203 Manila,  
Philippines  
T: (632) 242 4512  
F: (632) 241 7784

#### KUALA LUMPUR

No.9, Jalan USJ 21/11  
47620 Subang Jaya  
Selangor Darul Ehsan  
Malaysia  
T: (603) 8023 6969  
F: (603) 8023 616155

#### HANOI

158 Hoang Ngan Street  
Trung Hoa Ward  
Cau Giay District  
Hanoi Vietnam  
T: (84) 43 556 8505  
F: (84) 43 556 8506

#### SHANGHAI

No. 555 Nanjing  
West Road  
Unit 226, Shanghai  
P.R. China 200 041  
T: (86) 021 6256 2268  
F: (86) 021 6256 2278

#### INDONESIA

Pt. Serviam Abadimurni  
Ruko Roxy Blok A No  
21—22 Jl. M.H. Thamrin  
Kav. 155—159 Lippo  
Cikarang, Bekasi-17550  
Indonesia  
T: (6221) 8990 8142  
F: (6221) 8990 8140

For any enquiries or more details on our products & services,  
please email: [enquiry@zugophotonics.com](mailto:enquiry@zugophotonics.com) or visit our website at [www.zugophotonics.com](http://www.zugophotonics.com).