Optics + Photonics 2019

EXHIBITION GUIDE

Moving technology to market™

2019

Exhibition
13–15 August 2019

Conferences and Courses
11–15 August 2019

San Diego Convention Center
San Diego, California, USA

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**EXHIBITION GUIDE**

Tuesday 13 August · 10:00 am to 5:00 pm
Wednesday 14 August · 10:00 am to 5:00 pm
Thursday 15 August · 10:00 am to 2:00 pm

Exhibition: 13–15 August 2019
Conferences and Courses: 11–15 August 2019
San Diego Convention Center, San Diego, California, USA

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## Exhibition Ice Cream Social

Thursday · 12:30 to 1:30 PM  
Exhibition Hall  
Join representatives of companies in the exhibition and celebrate the end of the show with ice cream.
SPIE COURSES

Get the most out of your conference experience. Take a course at SPIE Optics + Photonics.

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HOW TO USE THIS GUIDE
SPIE Optics + Photonics exhibitors are listed in alphabetical order with details about products or services each is exhibiting. Companies are additionally cross-indexed by technology areas in the Product Category Index on pages 44-47, to allow you to quickly shop for products for your engineering and business needs.

Booth numbers are provided in the Exhibition Guide, and may be cross-referenced with the floor plan on page 7. The address of each exhibitor is also listed, making this Exhibition Guide an excellent reference tool.

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San Diego Convention Center, Sails Pavilion
San Diego, California, USA

3D AG #527
Laettichstrasse 4a, Baar, 6340 Switzerland
+41 41 768 25 25
sales@3dag.ch; www.3DAG.ch

Featured Product: Manufacturing nickel shims up to 1300 x 1700 mm² for replication of micro and nanostructures
We are an independent business based in Switzerland with 30 years of experience in micro- and nanotechnology. 3D AG explored and acquired a wide knowledge in the processing structures for various functionalities surfaces. We manufacture durable tools by electroforming processes. Additionally, if you hold a small sample, we have developed high precision UV step and repeat recombination machine enabling us to upscale your structure up to 1000 x 1200 mm² thus creating a large micro structured tool.
Contact: Martina Mueller, CEO, m.mueller@3dag.ch; Marek Krehel, Optical Engineer, m.krehel@3dag.ch
Production and upscaling of tools for micro and nanotechnology for mass replication.

4D Technology Corp. #523
A Nanometrics Business, 3280 E Hemisphere Loop Ste 146, Tucson, AZ, 85706-5039 (USA)
+1 520 294 5600; fax +1 520 294 5601
4Dinfo@nanometrics.com; www.4dtechnology.com

Featured Product: On-Axis Dynamic AccuFiz Fizeau Interferometer. On-axis for precision, dynamic for fast measurements
Designs and manufactures dynamic laser interferometers and optical profilers, micropolarizer cameras and surface defect gauges. With vibration-insensitive dynamic measurements, customers gain size & weight-reduced portability, easy integration into robotics, and measurements in difficult/turbulent environments. Serving: precision machined surfaces, optics, astronomy, aerospace, space-based telescopes, flexible electronics, automotive, and in-line production measurements. A Nanometrics business. Contact: Steve Martinek, VP of Sales and Marketing, smartinek@nanometrics.com; Edgar Schrock, Marketing Manager, eschrock@nanometrics.com
EXHIBITOR DIRECTORY

AccuCoat Inc.  #831

SPIE Corporate Member

111 Humboldt St Ste 8, Rochester, NY, 14609 (USA)
+1 585 288 2330; fax +1 585 288 2331
coatings@accucoatinc.com; www.accucoatinc.com

AccuCoat Inc. is a supplier of thin film coatings on plastic, metal, glass, and a variety of other components. Producing a wide range of anti-reflective, beamsplitter, hot & cold mirror, ITO, filter, and metallic coatings as well as custom coatings to meet your dynamic applications. Experienced in handling prototype thru OEM volumes. Coatings available from the UV to the NIR. Over 90 years combined engineering experience can provide custom designed solutions. Contact: Alan Parsons, Sales Manager, alan@accucoatinc.com

Accumold  #728

1711 SE Oralabor Rd, Ankeny, IA, 50021 (USA)
+1 515 964 5741; fax +1 515 964 5742
micromolding@accumold.com; www.accu-mold.com

Featured Product: Micro injection molding, polymer optics & more

Accumold® is a high-tech manufacturer of precision micro molded plastic components with part geometries from 5cm to less than 1mm in size. Processes include: insert molding, clean room molding and 2-shot molding. Materials include: peek, Ultem, LCP, and most engineered thermoplastics. Markets include: micro electronics, medical, micro optics, sensors and other emerging technologies. Contact: Aaron Johnson, VP Marketing, ajohnson@accumold.com; Rick Brown, Sales / Optics, rbrown@accumold.com

ADIT Electron Tubes  #900

300 Crane St, Sweetwater, TX, 79556-0870 (USA)
+1 325 235 1418; fax +1 325 235 2872
sales@electrontubes.com; www.et-enterprises.com

Featured Product: Photodetector modules for photon counting & analog detection will be on display

ADIT Electron Tubes designs and manufactures photomultiplier tubes, housings, voltage dividers, signal processing modules and photodetector modules. Photomultipliers are available in diameters from 1/2” to 11”, some with our new high QE photocathodes. Tubes are available for use at cryogenic temperatures, high temperatures, with low background glass and qualified for space flight. Two manufacturing facilities, in West Texas and West London, help to ensure fast delivery and competitive pricing. Contact: Paul Davison, Sales Manager, paul@electrontubes.com

We offer photodetector modules for analog detection and photon counting units with USB connection.

Agilent Technologies, Inc.  #323

2850 Centerville Rd, Wilmington, DE, 19808-1610 (USA)
+1 302 636 2000; fax +1 302 633 8916
cag_sales-na@agilent.com; www.agilent.com

Featured Product: Cary 7000 Universal Measurement Spectrophotometer

Agilent Technologies is a worldwide provider of GC, LC, MS and Spectroscopy instruments, technologies, related consumables, support, services, and workflow solutions that enable labs to analyze, confirm and quantify substances of interest with confidence while maintaining the most stringent laboratory practices, from sample preparation to final report. Learn more www.agilent.com. Contact: Jason Cherney, Marcom Specialist, jason_cherney@agilent.com

ALIO Industries Corp.  #434

5335 Xenon St, Arvada, CO, 80002-1348 (USA)
+1 303 339 7500; fax +1 303 339 7501
sales@alioindustries.com; www.alioindustries.com

Featured Product: ALIO's Patented Hybrid Hexapod®: Game changing performance in 6 degree of freedom positioning

ALIO Industries is an innovator in nano technology motion systems. Since 2001, ALIO's designs have been exceeding all industry standards for precision and quality in automation technology and is considered to be the gold standard for performance in most of the world’s metrology tools. Our True Nano® precision motion systems, including the Patented Hybrid Hexapod®, and along with more than 350 standard products offer our customers enabling solutions for state of the art applications. Contact: Walter Silvesky, VP Sales, walter.silvesky@alioindustries.com

ADIT Electron Tubes designs and manufactures photomultiplier tubes, housings, voltage dividers, signal processing modules and photodetector modules. Photomultipliers are available in diameters from 1/2” to 11”, some with our new high QE photocathodes. Tubes are available for use at cryogenic temperatures, high temperatures, with low background glass and qualified for space flight. Two manufacturing facilities, in West Texas and West London, help to ensure fast delivery and competitive pricing. Contact: Paul Davison, Sales Manager, paul@electrontubes.com

We offer photodetector modules for analog detection and photon counting units with USB connection.
All Flex Flexible Circuits and Heaters #517
1705 Cannon Ln, Northfield, MN, 55057-3605 (USA)
+1 507 663 7162; fax + 1 844 274 3970
marketing@allflexinc.com; www.allflexinc.com

All Flex is an industry leading flexible circuit and heater manufacturer providing prototype in high volumes with component assembly. Flex circuits include single-sided, double-sided, multilayer, and long Maxi-Flex with fine line capability. Quick turn custom and stock polyimide and silicone rubber heaters. All Flex has provided flexible solutions to the medical, aerospace, military, and industrial markets for over 25 years. AS9100, ISO9001, ITAR, MIL-PRF-31032/3 & MIL-PRF-31032/4 Certified.
Contact: Kelsey Smith, Marketing, ksmith@allflexinc.com

ALPAO S.A.S. #910
727 rue Aristide Bergès, Montbonnot St Martin, 38330 France
+33 476 890 965; fax +33 476 514 532
contact@alpao.fr; www.alpao.com

With more than 10 years of experience in adaptive optics, ALPAO designs and manufactures a complete range of adaptive optics products for use in research and industry from 2008. ALPAO provides deformable mirrors, wavefront sensors and softwares. ALPAO’s products are tailor-made for various applications such as astronomy, ophthalmology, microscopy, wireless optical communications and laser applications.
Contact: Abdesselem El Hassouni, Sales Engineer, abdesselem.elhassouni@alpao.fr

Amsterdam Scientific Instruments B.V. #114
Science Park 105, Amsterdam, 1098 XG Netherlands
+31 613 349900
hans.radhoe@amsins.com; www.amsins.com

Featured Product: Timepix3Cam, Ultrafast nanosecond optical camera for Ion/Electron/Neutron 3D imaging

Amsterdam Scientific Instruments is a fast growing high-tech company based at the Science Park in Amsterdam. We develop imaging detectors for X-rays, electron microscopy and mass spectrometry. Our hybrid pixel detectors are based on Cern’s Timepix/Medipix technology and have been implemented by many leading research institutes worldwide. It is our absolute goal to deliver and continue developing high performance, high quality detection and imaging products and technology to accelerate research. Contact: Hans Radhoe, Sales Director, hans.radhoe@amsins.com

Timepix3Cam, Ultrafast nanosecond optical camera for single photon counting to image Ions/Electrons.

Andor Technology Ltd. #120
300 Baker Ave Ste 150, Concord, MA, 01742-2124 (USA)
+1 860 290 9211; fax +1 860 290 9566
s.cummings@andor.com; www.andor.com

Andor is a global innovator in the manufacturing of high performance scientific cameras and spectroscopy systems. Engineered from the outset with “ease-of-use” in mind, every Andor Spectroscopy system features a combination of market leading detectors and spectral instruments, seamlessly controlled through a dedicated and intuitive software platform. From configuration of these pre-aligned, pre-calibrated instruments to integration into each unique laboratory set-up.

Andover Corporation #531
4 Commercial Dr, Salem, NH, 03079-2800 (USA)
+1 603 893 6888; fax +1 603 893 6508
info@andcorp.com; www.andcorp.com

Featured Product: IR Coating & Dicing Services

Andover Corporation was established in 1976 with the purpose of designing and manufacturing high-quality optical filters and coatings. Over the years as the company has grown, the focus has remained on quality. Our current facility spans 44,000 square feet on 17 acres of land in Salem, NH. We manufacture filters and coatings for a wide variety of applications. Our facility is custom-designed and state-of-the-art, and includes automated coating, glass polishing, and fabrication equipment.
Contact: Michael Tiner, Chief Operating Officer, mtiner@andovercorp.com; Mark Kfoury, Director of Technical Sales, mark.kfoury@andovercorp.com

Applied NanoTools Inc. #134
NINT Bldg, 11421 Saskatchewan Dr NW, Edmonton, AB, T6G 2M9 Canada
+1 780 628 5830; fax +1 780 628 5830
sales@appliednt.com; www.appliednt.com

High aspect ratio x-ray gratings and zone plates with >35:1 aspect ratio structures.
**Applied Surface Technologies**  
**#106**

**SPEI Corporate Member**

15 Hawthorne Dr, New Providence, NJ, 07974-1111 (USA)
+1 908 464 6675; fax +1 908 464 7475

coclean@co2clean.com; www.co2clean.com

**Featured Product: CO2 Snow Jet**

We demonstrate precision cleaning using a CO2 Snow Jet, a quick and safe process capable of removing particles of all sizes, (visible to below 5 nanometers), organic residues, solvent stains, and water spots. CO2 Snow cleans all types of substrates, optics, diamond turned optics, fiber-optics, wafers, mirrors, large telescopes mirrors, analytical samples (AFM & XPS), and many other items. We demonstrate manual, portable, and semi-automated units for R&D or manufacturing. Bring samples. Contact: Robert Sherman, roberts@co2clean.com

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**Asphericon GmbH**  
**#420**

**SPEI Corporate Member**

Stockholmer Str 9, Jena, 07747 Germany
+49 3641 3100500; fax +49 3641 3100501
sales@asphericon.com; www.asphericon.com

**Featured Product: Fast lane prototyping reduced lead time of up to 3 weeks for optical elements including coating**

As an independent and recognized specialist, asphericon is the technology leader in the field of aspheric systems. The production is based on a self-developed and patented technology for the control of CNC grinding and polishing machines. asphericon accompanies its customers from optical design, production and coating, full-surface interferometric measurement and documentation up to the assembly of optical components as well as their optical characterization. Contact: Steffen Schneider, President, s.schneider@asphericon-inc.com; Laura House, Sales Assistant, l.house@asphericon-inc.com

---

**Apre Instruments, Inc.**  
**#410**

**SPEI Corporate Member**

2440 Ruthrauff Rd Ste 100-120, Tucson, AZ, 85705 (USA)
+1 520 639 8195
sales@apre-inst.com; www.apre-inst.com

**Featured Product: SS0|HR Fizeau Interferometer - 50mm Aperture**

Need an Interferometer? A Pre gives you more! More performance in higher image resolution, greater slope acceptance and lower retrace errors. More source options: stabilized HeNe, SLM laser diodes, patented SCI technology and wavelength modulated options. More native apertures with 6mm, 50mm, 100mm, 150mm, 300mm, plus custom and beam expanded options. More product life with upgrades and restorations of most common interferometers; plus the option to add SCI technology to your upgrade. Contact: Donald (Don) Pearson II, Vice President Sales, dpearson@apre-inst.com; Robert Smythe, President, rmsmythe@apre-inst.com

---

**Avantes, Inc.**  
**#820**

**SPEI Corporate Member**

500 S Arthur Ave Ste 500, Louisville, CO, 80027-3038 (USA)
+1 303 410 8668; fax +1 303 410 8669
infousa@avantes.com; www.avantes.com

Avantes also features the high-resolution AvaSpec-NIR512-1.7-HSC-EVO as the newest in our NIRLine of Spectrometers for measurements to 1700 nm. Avantes is excited to debut the first ever 4096 pixel compact CMOS spectrometer, built with an automated manufacturing system providing unbeatable unit-to-unit repeatability and thermal stability. Avantes also features the high-resolution AvaSpec-NIR512-1.7-HSC-EVO as the newest in our NIRLine of Spectrometers for measurements to 1700nm. Contact: Damon Lenski, General Manager, infousa@avantes.com

---

**Avantes, a leader in fiber optic spectroscopy, offers a range of spectrometers, light sources, & fiber optics for measurements in the range 190-2500 nm. Avantes is excited to debut the first ever 4096 pixel compact CMOS spectrometer, built with an automated manufacturing system providing unbeatable unit-to-unit repeatability and thermal stability. Avantes also features the high-resolution AvaSpec-NIR512-1.7-HSC-EVO as the newest in our NIRLine of Spectrometers for measurements to 1700nm. Contact: Damon Lenski, General Manager, infousa@avantes.com

---

**Attocube systems Inc.**  
**#838**

2020 Stuart St, Berkeley, CA, 94703 (USA)
+1 510 649 9245
info@attocube.com; www.attocube.com

Attocube is the technology leader for ultra precise motion and sensing solutions compatible with extreme environmental conditions such as UHV, magnetic field, radiation exposure, as well as cryogenic to elevated operating temperatures. The portfolio also includes integrated measurement systems, such as the attoDRY800 cryo-optical table and a Photonic Probe Station, an ultra-stable, extremely compact and easy to use tabletop setup for nanophotonic device characterization.

---

**Avatars, a leader in fiber optic spectroscopy, offers a range of spectrometers, light sources, & fiber optics for measurements in the range 190-2500 nm. Avatars is excited to debut the first ever 4096 pixel compact CMOS spectrometer, built with an automated manufacturing system providing unbeatable unit-to-unit repeatability and thermal stability. Avatars also features the high-resolution AvaSpec-NIR512-1.7-HSC-EVO as the newest in our NIRLine of Spectrometers for measurements to 1700nm. Contact: Damon Lenski, General Manager, infousa@avantes.com

---

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## EXHIBITOR DIRECTORY

### Bruker Nano, Inc. #535
- **Optical Profilers and Stylus Profilers**, 3400 E Britannia Dr Ste 150, Tucson, AZ, 85706-5010 (USA)
- +1 520 741 1044; fax +1 520 294 1799
- productinfo@bruker.com; www.bruker.com

Bruker’s 3D optical microscopes and profilers provide analyses for samples ranging from microscopic MEMS to entire engine blocks. Our ContourGT® platform features proven, industry-leading metrology and easy to use Vision64® analysis software, delivering the high-speed operation, accuracy, and repeatability that top-level R&D and production requires. These profilers supply the specific information needed to answer R&D, QA/QC, and surface measurement questions with speed, accuracy, and ease. Contact: Steve Ziegler, stephen.ziegler@bruker.com

### Campbell Engineering Inc. #533
- 20412 Barents Sea Cir, Lake Forest, CA, 92630 (USA)
- +1 949 859 3306
- sales@campbellcnc.com; www.campbellcnc.com

**Featured Product:** Manufacturer of precision machined components specific to medical, photonics, and aerospace

Campbell Engineering strives to partner with customers to meet their customized needs. A complete ISO-9001 machine shop that includes 3, 4 & 5 axis CNC Mills (horizontal & vertical with on machine probing), Lathes, Wire EDM, CMM and Optical / Vision inspection systems. Your one-stop machine shop. Prototypes / High Speed Production / Assemblies / Kitting. CEI takes pride in precision and quality to surpass customer demands. “Today’s quality is tomorrow’s reputation”. Contact: James Campbell, President/CEO, sales@campbellcnc.com; Pam Nola, CFO, pam@campbellcnc.com

### Chroma Technology Corp. #734
- 10 Intec Ln, Bellows Falls, VT, 05101-3119 (USA)
- +1 802 428 2500; fax +1 802 428 2525
- sales@chroma.com; www.chroma.com

**Featured Product:** optical filters, illumination, contract engineering

Chroma is an employee-owned company that designs and manufactures precision optical filters and coatings from 220-2600nm for myriad applications. We provide application engineering support and short cycle times and are as comfortable designing and manufacturing custom filters as we are our catalog items; regularly offering custom filters at catalog prices. Contact: Kelly Stockewell, OEM Engineering, kstockwell@chroma.com; Christopher Conca, OEM Sales, cconca@chroma.com

### CMM Optic #835
- 488 Oliver Dr, Troy, MI, 48084-5426 (USA)
- +1 248 273 1111; fax +1 248 362 2152
- info@cmmoptic.com; www.cmmoptic.com

CMM Optic offers 30 years experience in the fabrication of precision diamond-turned optical components, opto-mechanical assemblies and integrated solutions, from prototype to high-volume production. CMM Optic is a global leading manufacturer in the optics industry for American-made precision products. Our state of the art facility and tenure in the optics industry allow us to excel in manufacturing and inspection of the most challenging optical components and assembled solutions. Contact: Tom Goundry, VP, Business Development, tgoundry@cmmoptic.com; Kevin McMahon, President, kmcmahon@cmmoptic.com

### Collins Aerospace - Sensors Unlimited Products #512
- 330 Carter Rd Ste 100, Princeton, NJ, 08540-7438 (USA)
- +1 609 333 8200; fax +1 609 333 8103
- sui_info@collins.com; www.sensorsinc.com

Sensors Unlimited, Inc., a Collins Aerospace company, develops innovative shortwave infrared (SWIR) sensing/imaging solutions based on indium gallium arsenide imaging technology. Products include InGaAs-SWIR cameras & systems, 1- and 2-D focal plane arrays & extended wavelength response InGaAs image sensors. Imaging applications include security/surveillance, near-infrared spectroscopy, line-scan inspection, process control, laser beam profiling, microscopy, OCT & art inspection. Contact: Paul Messina, Business Development Manager, paul.messina@collins.com; Scott Cogan, Business Development Manager, scott.cogan@collins.com

### Coursen Coating Labs, Inc. #924
- 2925 College Ave #A1, Costa mesa, CA, 92626 (USA)
- +1 714 585 4172
- dan@coursencoatinglabs.com; www.coursencoating.com

**Featured Product:** Proprietary Solderable Coating for Optics

Coursen Coating Labs specializes in developing innovative custom solutions to meet the changing needs of our customers who are facing a world of increasing competition and decreasing product life cycles. Let Coursen Coating Labs develop an innovative and cost effective solution to your problem that pushes the envelope in terms of performance while, at the same time, meeting your price requirements. Contact: Dan Coursen, President / CEO, dan@coursencoatinglabs.com

### DataRay Inc. #102
- 1675 Market St, Redding, CA, 96001-1022 (USA)
- +1 530 395 2500; fax +1 530 395 2500
- sales@dataray.com; www.dataray.com

**Featured Product:** The new TaperCamD-LCM has an active area of up to 25 x 25 mm with 12.5 μm pixels and a 2500:1 SNR

DataRay Inc. was founded in 1988 to bring affordable, high-performance beam profiling to the photonics community. DataRay manufactures precision, UV to 16 μm beam profiling instruments for laser, laser assembly and fiber optic telecom beam profiling and imaging to ISO 11146 standards. DataRay Inc. is an ISO 9001 certified company. Contact: Nea Hamilton, Sales Engineer, nhamilton@dataray.com; sales@dataray.com

The new TaperCamD-LCM is a large area CMOS beam profiler with 25 x 25 mm active area and 2500:1 SNR.
<table>
<thead>
<tr>
<th>Exhibitor Name</th>
<th>Exhibit Number</th>
<th>Address</th>
<th>Contact Information</th>
<th>Featured Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCM Tech, Corp.</td>
<td>#624</td>
<td>4455 Theurer Blvd, Winona, MN, 55987-1593 (USA)</td>
<td>+1 507 452 4043; fax +1 507 452 7970</td>
<td>DCM Tech designs and builds a line of precision rotary surface grinders. We have provided quality machine tool equipment and customer satisfaction since 1974. Our response to customer needs over the years has allowed us to provide long lasting, application specific, solutions to customers worldwide. Use of DCM Tech rotary surface grinders has consistently brought dollars to our customers' bottom line via process improvement. Contact: Brian Ebbing, Technical Specialist, <a href="mailto:brianebberger@dcm-tech.com">brianebberger@dcm-tech.com</a></td>
</tr>
<tr>
<td>Diverse Optics Inc.</td>
<td>#630</td>
<td>10310 Regis Ct, Rancho Cucamonga, CA, 91730 (USA)</td>
<td>+1 909 593 9330; fax +1 909 596 1452</td>
<td>We know that your optics are as unique as you are. You can reduce cost, trim weight, simplify design, and improve the performance of your optics using polymers. For 30 years, we've manufactured the most challenging polymer optic components and assemblies for leading defense, medical, and commercial applications with advanced technology and an experienced team of professionals. With our knowledge of injection molding and diamond turning, we'll show you how polymer optics are perfected. Contact: Letty Trevino, Sales Engineer, <a href="mailto:Letty.Trevino@Diverseoptics.com">Letty.Trevino@Diverseoptics.com</a></td>
</tr>
<tr>
<td>Dover Motion</td>
<td>#411</td>
<td>159 Swanson Rd, Boxborough, MA, 01719 (USA)</td>
<td>+1 508 475 3400; fax +1 508 836 3223</td>
<td></td>
</tr>
<tr>
<td>Edmund Optics Inc.</td>
<td>#333</td>
<td>101 E Gloucester Pike, Barrington, NJ, 08007-1380 (USA)</td>
<td>+1 856 547 3488; fax +1 856 573 6295</td>
<td>Edmund Optics is a leading global supplier of optics and optical components, designing and manufacturing a wide array of multi-element optical lenses, coatings, imaging systems, and optomechanical equipment. Led by skilled optical engineers and scientists, EO is application focused and pursues new ways to implement optical technology, enabling advancements in industrial metrology, semiconductor manufacturing, life sciences, and more. Contact: Customer Service, <a href="mailto:sales@edmundoptics.com">sales@edmundoptics.com</a></td>
</tr>
<tr>
<td>Electro Optics Magazine</td>
<td>#740</td>
<td>4 Signet Ct, Cambridge, CB5 8LA United Kingdom</td>
<td>+44 1223 221030</td>
<td>Electro Optics is the premier European Optics and Photonics magazine. Published by Europa Science, we offer up to date and in-depth news, features and information about the European photonics industry. Contact: Jon Hunt, Head of Business Development, <a href="mailto:jon.hunt@europascience.com">jon.hunt@europascience.com</a>; Charlie Mitchell, Partnership and Events Executive, <a href="mailto:charlie.mitchell@europascience.com">charlie.mitchell@europascience.com</a></td>
</tr>
<tr>
<td>Energetiq Technology, Inc.</td>
<td>#739</td>
<td>7 Constitution Way, Woburn, MA, 01801-1024 (USA)</td>
<td>+1 781 939 0763; fax +1 781 939 0769</td>
<td>Energetiq Technology, Inc. is a wholly-owned subsidiary of Hamamatsu, and manufactures ultra-bright Laser-Driven Light Sources (LDSL™) that offer an unmatched combination of radiance, stability, longevity and broad wavelength range. Energetiq's most recent innovation is advanced Laser-Driven Tunable Light Sources (LDSL™) that allow for precise wavelength selection. Energetiq also manufactures an EUV (Extreme Ultraviolet) source platform uniquely suited for 13.5nm semiconductor inspection applications. Contact: Mae Steinberg, Marketing Communications, <a href="mailto:info@energetiq.com">info@energetiq.com</a></td>
</tr>
<tr>
<td>Enli Technology Co., Ltd.</td>
<td>#712</td>
<td>1F., No.96, Luke 5th Rd., Luzhu Dist, Kaohsiung City, 821 Taiwan</td>
<td>+886 7 6955669; fax +886 7 6955785</td>
<td>Enli Technology Co., Ltd. is a leading global supplier of optics and optical components, designing and manufacturing a wide array of multi-element optical lenses, coatings, imaging systems, and optomechanical equipment. Led by skilled optical engineers and scientists, EO is application focused and pursues new ways to implement optical technology, enabling advancements in industrial metrology, semiconductor manufacturing, life sciences, and more. Contact: Customer Service, <a href="mailto:sales@edmundoptics.com">sales@edmundoptics.com</a></td>
</tr>
<tr>
<td>Epner Technology Inc.</td>
<td>#427</td>
<td>279 Frost St, Brooklyn, NY, 11225-5601 (USA)</td>
<td>+1 718 782 5948; fax +1 718 963 2930</td>
<td>Epner Technology Inc. is a leading global supplier of optics and optical components, designing and manufacturing a wide array of multi-element optical lenses, coatings, imaging systems, and optomechanical equipment. Led by skilled optical engineers and scientists, EO is application focused and pursues new ways to implement optical technology, enabling advancements in industrial metrology, semiconductor manufacturing, life sciences, and more. Contact: Customer Service, <a href="mailto:sales@edmundoptics.com">sales@edmundoptics.com</a></td>
</tr>
</tbody>
</table>
Evaporated Coatings, Inc. #639

SPIE Corporate Member
2365 Maryland Rd, Willow Grove, PA, 19090-1708 (USA)
+1 215 659 3080; fax +1 215 659 1275
sales@evapcoat.com; www.evaporatedcoatings.com

ECI deposits optical coatings including IBS LWP/SWP, Tri-band & bandpass filters, anti-reflection & attenuation coatings, low-pol. beamsplitters, transparent conductive, enhanced metal & dielectric mirrors. ECI expertly coats glass, Ultem, Zeonex, molded optics, semiconductors, crystals, ultra thin wafers, laser bars, prisms, fiber-ends & ball lenses. Wide experience coating high stain glasses, metals, micro optics, and crystals. Full aperture, IBS, APS & IAD deposition technologies. Contact: Joe Brychell, VP- Sales & Marketing, sales@evapcoat.com; Amanda Burke, Sales Engineer, aburke@evapcoat.com

Filmetrics, Inc. #438

10655 Roselle St, San Diego, CA, 92121-1506 (USA)
+1 858 573 9300; fax +1 858 573 9400
info@filmetrics.com; www.filmetrics.com

Fresnel Technologies Inc. #309

101 W Morningside Dr, Ft Worth, TX, 76110-2708 (USA)
+1 817 926 7474; fax +1 817 926 7146
sales@fresneltech.com; www.fresneltech.com

Featured Product: Our 250μm diameter molded PMMA aspheric lens will excel in endoscopes and other micro applications

Fresnel Technologies has the largest off-the-shelf polymer optics catalog in the US. We design and manufacture orders large and small, from millions of parts to a single prototype. Our diamond turning machines allow micro- and nano-machining of metal and polymer optics. We produce silicone lenses, microlens arrays, and AR/VR lenses. From conventional plastic lenses to freeform optics, from Fresnel lenses for the visible spectrum to passive IR optics for the Internet of Things, we make it all. Contact: Linda Claytor, Vice president, lclaytor@fresneltech.com; Nelson Claytor, President, nclaytor@fresneltech.com

GPD Optoelectronics Corp. #100

SPIE Corporate Member
7 Manor Pkwy, Salem, NH, 03079-2842 (USA)
+1 603 894 6865; fax +1 603 894 6866
sales@gpd-ir.com; www.gpd-ir.com

GPD Optoelectronics Corp., is a global supplier of Ge & InGaAs photodetectors operating in the 0.8 to 2.6 micron short wave infrared (SWIR) spectrum. The Ge photodiodes, InGaAs photodiodes and InGaAs APDs are available in die on carrier, TO package, TEC module, single/multi-mode fiber (with high reliability packaging), SMA/FC/SC/ST active mount, & custom designs. GPD has Si over Ge, Si over InGaAs, InGaAs over InGaAs “two-color sandwich” sensors for ratio pyrometry & InGaAs quadrant sensors. Contact: George Gasparian, Sales/Application Engineer, ggasparian@gpd-ir.com; Rufus Ward, President, rrward@gpd-ir.com

GS Plastic Optics #621

SPIE Corporate Member
408 St. Paul Street, Rochester, NY, 14605-1788 (USA)
+1 585 295 0200; fax +1 585 232 2314
gpartners@gsoptics.com; www.gsoptics.com

Featured Product: Precision Polymer Optics

GS Plastic Optics works with executives and program managers to solve complex optical challenges. We manufacture high-performance injection molded polymer optics specifically designed to help customers improve their competitiveness and market share. Our in-house team consists of experts in diamond turning, thin film coating, mold fabrication, and opto-mechanical assembly. We have all of the advanced metrology equipment needed to control performance and quality. Contact: Bob Podlena, Director of Sales and Marketing, rpodlena@gsoptics.com; Steve Orth, Sales Executive, sorth@gsoptics.com

Hamamatsu Corp. #735

SPIE Corporate Member
360 Foothill Rd, Bridgewater, NJ, 08807-2932 (USA)
+1 920 231 0960; fax +1 908 231 1539
cwaller@hamamatsu.com; www.hamamatsu.com

Hamamatsu Corporation is the North American subsidiary of Hamamatsu Photonics K.K. (Japan), a leading manufacturer of devices for the generation and measurement of infrared, visible, UV light and x-rays. These devices include silicon photomultipliers, photodiodes, photomultiplier tubes, image sensors, cameras, and light sources. Hamamatsu Photonics also offers specialized systems for select applications.

Hardin Optical Co. #520

SPIE Corporate Member
PO Box 219, 87679 Kehl Ln, Bandon, OR, 97411-0219 (USA)
+1 541 347 9467; fax +1 541 347 8176
optics@hardinoptical.com; www.hardinoptical.com

Featured Product: Custom Optical Components

Hardin Optical manufactures precision optical components for commercial and defense applications. We fabricate custom optical elements used in UV, Visible, and IR applications. Our manufacturing facility includes CNC grinding and polishing, conventional grinding and polishing, diamond turning, and thin film coating capabilities. We take pride in our record of on-time delivery of quality products. Hardin Optical Company was founded in 1976. www.hardinoptical.com
**Heidelberg Instruments Inc.**

**SPIE Corporate Member**

2539 W 237th St Ste A, Torrance, CA, 90505 (USA)
+1 310 212 5071; fax +1 310 212 5254
info@himt.us; www.himt.us

Heidelberg Instruments is a world leader in the production of high precision photolithography systems and maskless aligners. Heidelberg Instruments has an installation base of over 850 systems in more than 50 countries. Our systems are installed in academic and industrial sites and are used in research, development and production. Applications include MEMS, microfluidics, micro optics, MOEMS, CMOS, semiconductor packaging, display technology and many more. Contact: Niels Wijnaendts van Resandt, Director of Sales North & South America, sales@himt.de

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**HEIDENHAIN Corp.**

**SPIE Corporate Member**

333 State Pkwy, Schaumburg, IL, 60173-5337 (USA)
+1 847 490 1191; fax +1 847 490 3931
marketing01@heidenhain.com; www.heidenhain.com

ETEL, founded in 1974 and based in Switzerland, is a supplier 100% dedicated to direct drive technology. Their range of linear and torque motors, position and motion controllers and high-end motion system products provides a large selection to meet nearly all customers' needs and the process improvement they've been looking for. The synergies with companies belonging to the HEIDENHAIN Group have allowed ETEL to merge its respective knowledge and expertise, and proved to be a winning combination. Contact: Daniel Wiseman, Motion Systems Sales Engineer, dwiseman@heidenhain.com; Peter Suliga, Regional Sales Mgr, Motion Systems, psuliga@heidenhain.com

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**HILLTOP Technology Laboratory, Inc.**

**SPIE Corporate Member**

51 Parker, Irvine, CA, 92618 (USA)
+1 949 680 2525; fax +1 949 289 9940
sales@hilltop21.com; www.hilltop21.com

HILLTOP Technology Laboratory, Inc. specializes in prototypes, custom CNC machining, short-run productions, and quick-turnaround products. Rapid prototyping of precision machining is its specialty. Contact: Yumi Ryan, Purchaser / Administrative Assistant, sales@hilltop21.com

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**HOFSTADTER Analytical Services, LLC**

**SPIE Corporate Member**

10 N Norton Ave Ste 120, Tucson, AZ, 85719-6038 (USA)
+1 520 747 3282; fax +1 520 747 3282
dan@hofstaderanalytical.com; www.hofstaderanalytical.com

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**Himax IGI Precision**

**SPIE Corporate Member**

4611 E Lake St, Minneapolis, MN, 55406-2305 (USA)
+1 612 721 6283; fax +1 612 721 3802
sales@himaxigi.com; www.himaxigi.com

**Featured Product: Micro Optic Arrays, Diffraction Optics, Nano Structures for prototype & high volume optics, DOE, MLA**

Himax IGI designs & manufactures innovative micro & nano patterns for displays, optics, telecommunications, biomedical, & other applications. NanoSculpt technologies are used to make photosensitive masters, nickel shims, & soft molds with diverse pattern characteristics that create the desired surface or optical properties. Products made by Himax IGI are used in Nano-imprint lithography, injection molding, roll-to-roll, embossing, stamping, & other prototype and high volume manufacturing processes. Contact: Kendra Stritch, Sales Engineer, kendra_stritch@himaxigi.com; Rob Larsen, VP, rob_larsen@himaxigi.com

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**Hinds Instruments, Inc.**

**SPIE Corporate Member**

7245 NW Evergreen Pkwy Ste 150, Hillsboro, OR, 97124 (USA)
+1 503 690 2000; fax +1 503 690 3000
sales@hindsinstruments.com; www.hindsinstruments.com

**Featured Product: POLSnap an Affordable Stokes Polarimeter with a Data Rate of 4 Stokes Vectors per Second**

Hinds Instruments - a global leader in polarization measurement and analysis - innovates, develops, manufactures and distributes polarization measurement instrumentation for research and industry. Our standard and custom products, both integrated systems and stand-alone components, are designed for our markets: FPD, LCD, pharmaceutical development, materials research, solar and fusion energy research, thin films and more. Please visit us at www.hindsinstruments.com for more information. Contact: Connie Wimmer, Sales Engineer, sales@hindsinstruments.com; Andrew Werst, Sales Engineer, sales@hindsinstruments.com

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**HIWIN Corp.**

**SPIE Corporate Member**

12455 Jim Dhamer Dr, Huntley, IL, 60142-8065 (USA)
+1 847 827 2270; fax +1 847 827 2291
info@hiwin.com; www.hiwin.com

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**Hofstadter Analytical Services, LLC**

**SPIE Corporate Member**

10 N Norton Ave Ste 120, Tucson, AZ, 85719-6038 (USA)
+1 520 747 3282; fax +1 520 747 3282
dan@hofstaderanalytical.com; www.hofstaderanalytical.com
## EXHIBITOR DIRECTORY

### HOYA Corp. USA #116

**SPIE Corporate Member**

Optics Div, 680 N McCarthy Blvd Ste 120, Milpitas, CA, 95035-5120 (USA)

+1 408 654 2200; fax +1 408 654 2270

opticsales.hoyausa@hoya.com; www.hoyaoptics.com

**Featured Product:** W Series - Sharp Cut Filters & ND Filters, UV-VIS-NIR Color Filters, Speciality and Optical Glasses

HOYA CORP USA Optics Division is a leading supplier of filter, optical and specialty glasses in semi-finished and finished forms. We operate around a worldwide network of R&D, precision manufacturing and mass scale production facilities, enabling HOYA to offer End-to-End Solutions unmatched by our competitors. Large selection of standard stock and custom components. UV-VIS-NIR ND Color Filters, Optical & Speciality glasses in various forms: Lenses, blanks, strips & blocks. Contact: Brett Martin, General Manager, brett.martin@hoya.com; Naoko Sato-Tazuma, Account Manager of Sales, naoko.sato@hoya.com

### II-VI Optical Systems #632

**SPIE Corporate Member**

36570 Briggs Rd, Murrieta, CA, 92563-2347 (USA)

+1 951 926 2994; fax +1 951 926 9026

opticalsystenms.info@ii-vi.com; www.opticalsystenms.com

**II-VI Optical Systems’ expanding and extensive capabilities cover a wide range of products and applications, including high precision optical assemblies, high energy lasers, hypersonic applications, infrared optics, thin film coatings and optical materials. As a vertically integrated provider, II-VI Optical Systems is uniquely positioned to meet the critical and complex design, engineering, and production requirements of customers in the defense, aerospace and commercial industries. Contact: Janice Roewer, Inside Sales Manager, janice.roewer@ii-vi.com**

### Infinite Optics Inc. #841

**SPIE Corporate Member**

1712 Newport Cir Ste F, Santa Ana, CA, 92705-5118 (USA)

+1 714 557 2299; fax +1 714 557 2170

info@infiniteoptics.com; www.infiniteoptics.com

**Featured Product:** High Efficiency AR Coatings from .9-14nm on various Chalcogenide glass

Infinite Optics specializes in optical thin-film coatings ranging from 193nm’s to 20 microns. We support astronomical, industrial, medical and military markets by fabricating and coating optics required for telescopes, lasers and optoelectronic devices. Our services include special applications, development, production runs and quality control. We are DDTC registered and ITAR compliant. Contact: Stan King, Sales Manager, stan@infiniteoptics.com; Geza Keller, Sales, geza@infiniteoptics.com

### INO #726

**SPIE Corporate Member**

2740 Einstein St, Quebec, QC, G1P 4S4 Canada

+1 418 657 7006; fax +1 418 657 7009

info@ino.ca; www.ino.ca

**Featured Product:** INO’s QuickCTR passive lens auto-centering offers fast and precise alignment. License available

INO provides innovation in the field of optics/photonics. The solutions provided to our customers are ranging from product development to industrialization and technology transfer/licensing. Specialties: passive lens auto-centering technology, optical and optomechanical design, MEMS foundry and packaging, THz, IR, multispectral and hyperspectral imaging, fibres and fiber lasers, lidars, 3D sensors. Contact: Eric Pineau, Sales Director, eric.pineau@ino.ca

**INO’s QuickCTR passive lens auto-centering offers fast and precise alignment. License available.**

### Inrad Optics #816

**SPIE Corporate Member**

181 Legrand Ave, Northvale, NJ, 07647-2498 (USA)

+1 201 767 1910; fax +1 201 767 9644

sales@inradoptics.com; www.inradoptics.com

Inrad Optics manufactures optical components and assemblies for applications from sensing to imaging. We grow non-linear crystals, scintillation crystals, and x-ray diffraction crystals. Products include toroids and bent crystal x-ray analyzers, fast neutron detectors, transmission window assemblies, Pockels cells, aspheric reflective mirrors, beamsplitters, lenses, and waveplates. Contact: Sales Team, sales@inradoptics.com

### IOP Publishing Ltd. #908

**SPIE Corporate Member**

Temple Circus, Temple Way, Bristol, BS1 6HG United Kingdom

+44 117 929 7481; fax +44 117 929 4318

custserv@iop.org; www.ioppublishing.org

**Featured Product:** JPhys Photonics is a new open access journal highlighting the most significant optics research

IOP Publishing’s portfolio includes journals, books, conference proceedings and science news resources. Our titles Journal of Optics, JPhys: Photonics, Laser Physics and Laser Physics Letters serve the whole of the optics community. Contact: Ben Sheard, Publisher, ben.sheard@ioppublishing.org
IRD Glass
810 E St Paul St, Litchfield, MN, 55355 (USA)
+1 320 693 7217; fax +1 320 693 7216
ird@irdglass.com; www.irdglass.com

**Featured Product:** Precision custom Fused Silica light pipes and homogenizers

IRD Glass—A first aid station for your frustrations for over 36 years! IRD does things with glass that no one else in the world does! IRD Glass provides a full spectrum of custom manufacturing capabilities: Sapphire windows, laser reflectors, HLDT mirrors, filters, precision tubes, cylinder & rod lenses, prisms, wedges, light pipes, assemblies, thin-film coatings and the metrology to measure & verify our processes. IRD will always be here when you need us most! Contact: Michelle deCastro, National Sales Manager, michelle.decastro@irdglass.com

**Isuzu Glass, Inc.**
23505 Crenshaw Blvd Ste 130, Torrance, CA, 90505-5225 (USA)
+1 310 517 1866; fax +1 310 517 1869
sales@isuzuglass.com; www.isuzuglass.com

**Featured Product:** Optical colored glass, produced by Isuzu’s unique composition process, Glass molded lens

For around 110 years, Isuzu Glass has been developing original techniques and know-how and supplying a variety of optical glass to customers using unique manufacturing methods. Our mold division, melting division, polishing division, coating division and r&d division, all 5 division will make it possible to offer the largest line-up of functional glass products used in the wavelength range of invisible ultraviolet and far-infrared rays. Contact: Hiro Yokoi, President, sales@isuzuglass.com; Naoko Kaga, Advanced Engineer, nkaga@isuzuglass.com

**J.A. Woollam**
645 M St Ste 102, Lincoln, NE, 68508-2243 (USA)
+1 402 477 7501; fax +1 402 477 8214
sales@jawoollam.com; www.jawoollam.com

**Featured Product:** New Theta-SE for fast mapping of film properties. New iSE for real-time growth and etch rates

The J.A. Woollam Company offers a wide range of spectroscopic ellipsometers for non-destructive materials characterization, including thin film thickness (single and multilayer films), refractive index, optical constants n&k, alloy composition, in-situ growth/etch rates, and more. Woollam company offers ellipsometer instruments for research and manufacturing metrology. Woollam offers table-top, in-line, and in-situ models covering spectral ranges from the vacuum ultra-violet to far infrared. Contact: Ron Synowicki, Engineer, sales@jawoollam.com; Andrew Martin, Engineer, sales@jawoollam.com

**James C. Wyant College of Optical Sciences**
94 Meinel Bldg, 1630 E University Blvd, Tucson, AZ, 85721-0095 (USA)
+1 520 621 6997; fax +1 520 626 1480
info@optics.arizona.edu; www.optics.arizona.edu

**Featured Product:** Education & Research

The University of Arizona College of Optical Sciences educates students in all aspects of the study and application of light, performing internationally recognized research in optical engineering, quantum optics, applied optics and photonics, and image science. The College of Optical Sciences is the world’s premier optical institute, with award-winning faculty members, a diverse student body, challenging courses, pioneering research programs and close relationships with the optics industry. Contact: R. John Koshel, Associate Dean of Academics, jkoshel@optics.arizona.edu; Kaye Rowan, Development Director, rowan@optics.arizona.edu

**Kaufman & Robinson, Inc.**
1330 Blue Spruce Dr, Fort Collins, CO, 80524-2030 (USA)
+1 970 495 0187; fax +1 970 484 9350
krisales@ionsources.com; www.ionsources.com

**Featured Product:** We have a variety of sources for optics and photonics applications, including ion assist

Our products are vacuum-based process tools which interact with materials at the atomic level. Typical material processes include the precision deposition of thin films, remote plasma etching of patterned wafers, and nanometer-scale modification of surfaces. We are respected across the globe for innovative designs, product quality and technical expertise. Our products incorporate technical features such as gridded or gridless sources, DC or RF discharges and automated power supply controllers. Contact: Chris Griffith, Director of Sales, griffith@ionsources.com; Carrie Stadtmueller, Marketing, stadtmueller@ionsources.com

*We have a variety of sources for many optics and photonics applications, including ion-assist.*
KOHZU Precision & LAB Motion Systems

c/o Daniel F Crews, LLC #118

c/o Daniel F Crews, LLC, PO Box 2804, Evergreen, CO, 80437-2804 (USA)
+1 303 944 1082
dan@dfcrews.com; dfcrews.com

Featured Product: KOHZU offers multiple motorized 6-axis motion systems ideal for optical applications in ATMO and VAC

KOHZU Precision (est. 1945), manufactures reliable, high precision, production quality, linear stages (X & XY), rotary axes (R), vertical lift stages (zed axis, Z), Tip/Tilt stages for atmo or vac environments. Manual or motorized. KOHZU also manufactures 6-axis alignment stations, metrology & synchrotron equipment. Perfect for LABS, EDU and Industrial Equipment. DFCrews also represents LAB Motion Systems, a manufacturer of precision and ultra-precision rotary air bearings and multi-axis system. Contact: Dan Crews, President, dan@dfcrews.com

Labsphere, Inc. #412

PO Box 70, North Sutton, NH, 03260-0070 (USA)
+1 603 927 4266; fax +1 603 927 4694
labsphere@labsphere.com; www.labsphere.com

LaCroix Precision Optics #613

PO Box 2556, Batesville, AR, 72503 (USA)
+1 870 698 1881; fax +1 870 698 1880
info@lacroixoptics.com; lacroixoptics.com

Featured Product: Short lead time precision aspheres

Since 1947, LaCroix Precision Optics has positioned itself as a premier domestic volume and prototype manufacturer of custom precision optics. Capabilities include spherical, aspherical, plano, and custom coated optics. At our facility in Batesville, Arkansas, we use both traditional methods and advanced CNC processing to achieve the highest level of precision and quality demanded by our customers. ISO 9001:2015, ITAR certified and compliant.

Lake Shore Cryotronics, Inc. #623

575 McCorkle Blvd, Westerville, OH, 43082-8699 (USA)
+1 614 891 2244; fax +1 614 818 1600
info@lakeshore.com; www.lakeshore.com

Laser Components USA, Inc. #425

116 S River Rd Unit C, Bedford, NH, 03110-6734 (USA)
+1 603 821 7040; fax +1 603 821 7041
info@laser-components.com; www.laser-components.com

Featured Product: Standard or custom coated wafers up to 12” with AR coatings or mirrors

One of our strengths is the in-house production of coatings for laser optics. Our manufacturing capabilities include E-Beam coating, Ion-Assisted Deposition (IAD) coating and Ion Beam Sputtering (IBS) coating. We provide a number of standard coatings as well as coating solutions, designed specifically for your application requirement. Contact: Matt Robinson, Sales Director, sales@laser-components.com; Huyen Vu, Sales Director, sales@laser-components.com

Laser Focus World #721

PennWell Technology Div, 61 Spit Brook Rd Ste 501, Nashua, NH, 03062 (USA)
+1 603 891 0123; fax +1 603 891 0574
info@laserfocus.com; www.laserfocusworld.com

Published since 1965, Laser Focus World - a monthly magazine for engineers, researchers, scientists, and technical professionals - provides comprehensive global coverage of optoelectronic technologies, applications, and markets. Nearly 80,000 qualified optoelectronics professionals from around the world currently subscribe. Contact: Jeff Nichols, National Sales Manager, jeffn@pennwell.com; Anne Marie St. John-Brooks, Regional Sales Manager, annemarie@pennwell.com
## Laser Quantum Inc.

**#429**

**SPIE Corporate Member**

47673 Lakeview Blvd, Fremont, CA, 94538-6544 (USA)  
+1 510 210 0157; fax +1 408 352 6192  
lqinc.admin@laserquantum.com; www.laserquantum.com  

**Featured Product:** Gem 640nm DPSS laser at 50-500mW MTTF >400,000 hours Low noise & high stability for high throughput  

Laser Quantum is a world-class manufacturer of revolutionary continuous wave and ultrafast laser sources. Our products lead in their performance specifications, reliability, compactness and operational lifetimes. Our lasers are helping scientists to break new ground in applications ranging from attosecond physics to forensics and genomics. Laser Quantum is now part of Novanta, a trusted technology partner to OEMs in the medical and advanced industrial technology markets.  

Contact: Ben Sedgley, Sales Engineer, ben.sedgley@laserquantum.com; Barney Mitchell, VP Sales and Marketing, barney.mitchell@laserquantum.com  

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## LightTrans International UG

**#110**

**SPIE Corporate Member**

Kahlaische Str 4, Jena, 07745 Germany  
+49 36 41 5312950; fax +49 36 41 5312901  
info@lighttrans.com; www.lighttrans.com  

**Featured Product:** VirtualLab Fusion – Fast Physical Optics modelling and design software  

LightTrans group is based in Jena in the state of Thuringia, the historical and present center of optics in Germany. Our products and services shorten or even enable development cycles of optical components and systems. All our activities are based on the Fast Physical Optics design software “VirtualLab Fusion”, which provides ray tracing and physical optics field tracing methods. Our products include optical design software, optical engineering, training and consulting as well as prototyping.  

“VirtualLab Fusion - enabling fast physical optics modeling and design for complex optical systems”.

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## Luminate

**#716**

**SPIE Corporate Member**

260 E Main St Ste 6000, Rochester, NY, 14604 (USA)  
+1 585 214 0589; fax +1 585 327 7931  
info@nextcorps.org; www.luminate.org  

**Featured Product:** Luminate Startup Accelerator Program  

Luminate is the world's largest startup accelerator for Optics, Photonics, and Imaging enabled applications. The competitive program accepts 10 companies per year, and awards $100,000 in funding to each, along with the chance to compete for up to $2 million in follow-on funding. Mentoring, training, and connections to the global OPI ecosystem and investors is provided. Applications are accepted June 1 through September 30 at luminate.org/apply  

Contact: Sujatha Ramanujan, Managing Director, sujatha.ramanujan@nextcorps.org; Holly Barrett, Marketing Director, holly.barrett@nextcorps.org  

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## Luxel Corp.

**#834**

**SPIE Corporate Member**

PO Box 1879, 60 Saltspring Dr, Friday Harbor, WA, 98250-9062 (USA)  
+1 360 378 4137; fax +1 360 378 4266  
luxel@luxel.com; www.luxel.com  

**Featured Product:** Soft X-Ray Filters for Princeton Instruments’ PI-MTE Camera  

Luxel is the world’s leading producer of ultra-thin freestanding filters for soft x-ray & EUV transmission. We offer more than 70 different materials, with thicknesses ranging from 8nm to 20μm, & custom 2D and 3D apertures. Luxel products, including spaceflight filters, pressure windows, & sensor protectors, are assembled in Class 5 cleanrooms. We offer extensive technical support with thin film modeling, characterization, & CAD capabilities. Lead times as short as 1 week.  

Contact: Travis Ayers, President, Travis.Ayers@luxel.com; Ben Zeiger, Chief Scientist, Ben.Zeiger@luxel.com  

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## Mad City Labs., Inc.

**#534**

**SPIE Corporate Member**

2524 Todd Dr, Madison, WI, 53713-2317 (USA)  
+1 608 298 0855; fax +1 608 298 9525  
sales@madcitylabs.com; www.madcitylabs.com  

**Featured Product:** The Mad360™ precision rotation stage.  

Bidirectional continuous motion: 1 mrad steps, 20 rotation/sec  

Mad City Labs designs & manufactures a complete product line of high precision piezo nanopositioners, micropositioners, and microscopes suitable for inspection, metrology, microscopy, and astronomy applications. Our nanopositioners include PicoQ® sensors yielding picometer precision and low noise performance. Our micropositioners & microscope stages have excellent stability and control. Mad City Labs provides innovative solutions from the micro-to-pico scale with outstanding technical support.  

Contact: Technical Sales, sales@madcitylabs.com; European Sales, sales@madcitylabs.eu  

The Mad360™ is a compact rotational stage with minimum steps of 1 milliradian and speeds up to 20Hz.
EXHIBITOR DIRECTORY

Masimo Semiconductor #640
25 Sagamore Park Rd, Hudson, NH, 03051 (USA)
+1 603 595 8900; fax +1 603 595 0975
www.masimosemi.com

Meadowlark Optics, Inc. #926
SPIE Corporate Member
5964 Iris Pkwy, Frederick, CO, 80504-6412 (USA)
+1 303 833 4333; fax +1 303 833 4335
sales@meadowlark.com; www.meadowlark.com
Featured Product: High Speed Liquid Crystal Variable Retarders and Spatial Light Modulators
Meadowlark Optics designs, develops, and manufactures an extensive range of high quality polarization systems and components including liquid crystal devices from the UV to MWIR. Standard products include shutters, rotators, waveplates/retarders, spatial light modulators, tunable optical filters, tri-color filters, polarizers, polarimeters and more. We also provide custom solutions and a complete line of fabrication services. Contact: Kelly Gregorak, kelly@meadowlark.com; Ron Stepanek, Sales, rstepanek@meadowlark.com

Micro Laser Systems, Inc. #325
SPIE Corporate Member
12841 Western Ave Ste H, Garden Grove, CA, 92841-4025 (USA)
+1 714 898 6001; fax +1 714 897 0979
sales@microlaser.com; www.microlaser.com
Featured Product: FC3 & FC7 Fiber Collimators and Pigtailed Laser Modules
We are a manufacturer of diffraction limited fiber coupled laser systems, optical systems and fiber optic systems from 240nm to 6000nm. Unique products include various sizes of fiber collimators, splitters, combiners, fibers and receivers. They are used in quantum optics, scanning, lidar, free space comm, optical tweezers, metrology, etc. Our expertise in combining lasers, optics and fiber optics ensures the systems work in your application. We design and build all products in California. Contact: Norma Adachi, Marketing Director, norma@microlaser.com

New FC3 and FC7 fiber collimators with 1mm and 3mm beams

SPONSOR

Millennium Optical System Co., Ltd. #738
29 Dunbangi-gil, Beobwon-eup (332-8 Sambang-ri, Paju-si, Kyonggi, 10829 Korea, Republic of
+82 31 946 7041; fax +82 31 946 7043
sales@mosoptics.com; www.mosoptics.com
Featured Product: Optical lens, window, prism, filter, beamsplitter, mirror, Assemblies, IR, ITO, Coating
MOS is a professional manufacturer of optical components, producing prism, lens, filter and so on used in many industries such as electricity, telecommunication, electronics, optical research institutes, and making precision optical components related to major industries such as space equipment, core parts for defense, advanced medical equipment, laser equipment, core parts for precision instruments, semiconductor equipment, core parts, etc. Contact: Youngsu Kim, USA Branch manager, youngsu.kim@mosoptics.com; Amy Kang, Assistant manager, sales@mosoptics.com
Special prisms with the tightest angular and surface tolerances.

MilliporeSigma #922
6000 N Teutonia Ave, Milwaukee, WI, 53209 (USA)
+1 800 558 9160; fax +1 800 962 9591
aldrich@sial.com; www.sigmaaldrich.com
Featured Product: Nanomaterials; Quantum Dots; Organic Electronic and Solar Cell Materials
Sigma-Aldrich Materials Science is a strategic technology initiative of MilliporeSigma, a business of Merck KGaA, Darmstadt, Germany. The leading provider of materials for use in energy, biomedical, and electronics research. Our inorganic and organic chemicals, polymers, nanomaterials, and materials for electronics and alternative energy are used worldwide. We support innovation through development and distribution of state-of-the-art materials, scientific collaboration and manufacturing. Contact: Taryn Fuhrman-Hall, Product Marketing, taryn.fuhrman@milliporesigma.com; Richard Sullivan, Product Manager, richard.sullivan@milliporesigma.com
1 mg/mL (electrochem. exfoliated graphene) / 0.2 mg/mL (PEDOT:PSS) hybride ink dispersion in DNF.
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**SPIE Corporate Member**

10000 4th St, Rancho Cucamonga, CA, 91730-5723 (USA)

+1 909 989 1728; fax +1 909 987 3709

sales@mindrum.com; www.mindrum.com

Custom machining and polishing of ultra-precision components and assemblies. Complex shaping ability with 5-axis CNC milling, CNC turning and CNC surface grinding. Plano, spherical and cylindrical polishing using spindle, continuous and double-sided equipment. We work with hard materials i.e. glass, quartz, sapphire and ceramics, etc. Also work with conventional materials i.e. aluminum, steel and titanium, etc. Other capabilities include glassblowing, acid etching, soldering, wire EDM and dicing. Contact: Linda Kondris, Technical Sales, linda@mindrum.com; Dave Hamilton, Vice President, dave@mindrum.com

**MKS Instruments, Inc.**

**SPIE Corporate Member**

1791 Deere Ave, Irvine, CA, 92606-4814 (USA)

+1 949 863 3144; fax +1 949 253 1680

sales@newport.com; www.mksinst.com

Spectra-Physics, Ophir and Newport are brands within the MKS Instruments Light & Motion division. We provide a full range of solutions including lasers, beam measurement and profiling, motion control, vibration isolation systems, photonics instruments, opto-mechanical components and optical elements. Contact: Bill Casey, bill_casey@mksinst.com

**Moulded Optics GmbH**

Steinstrasse 13-15, Schöffengrund, 35641 Germany

+49 6445 6000 0; fax +49 6445 6000 40

info@mouldedoptics.com; www.mouldedoptics.com

**Featured Product: Molded glass and plastic optical components**

Moulded Optics GmbH, an ISO 9001:2015 certified supplier, will be displaying many types of molded glass and plastic optical components including standard aspheric lenses from 4mm to 80mm diameter sizes, half-ball (Hemispheres) lenses in 3mm, 4mm, 5mm and 6mm diameter sizes, and custom molded glass and plastic optical components from approximately 2mm to 100mm sizes, including lenses, hybrid optics, micro Lens, arrays, mirrors, prisms and special shapes for illumination applications. Contact: Martin Pfeil, Managing Director, martin.pfeil@mouldedoptics.com; Astrid Lehr, Sales Manager, sales@mouldedoptics.com

**MOXTEK Inc.**

**SPIE Corporate Member**

452 W 1260 N, Orem, UT, 84057-2941 (USA)

+1 801 225 0930; fax +1 801 221 1121

info@moxtek.com; www.moxtek.com

**Featured Product: Inorganic wire-grid polarizers & polarizing beam splitters**

MOXTEK® manufactures high performance components for analytical x-ray instrumentation and optical systems. Our inorganic Nanowire® optical polarizers & polarizing beam splitters are ideal for applications that require broadband wavelengths, heat tolerance, and large angles of incidence. Our UV-VIS-IR polarizers are used for a variety of application including: 2D & 3D projection display, machine vision, HMD, HUD, polarimetry, medical/dental imaging, interferometry, spectroscopy, and many others. Contact: Taylor Taniuchi, Sales Engineer, ttaniuchi@moxtek.com; Jenifer Powell, Key Account Specialist, jpowell@moxtek.com

**MPS Micro Precision Systems AG**

Chemin du Long-Champ 95, Biel/Bienne, 2504 Switzerland

+41 32 344 43 00; fax +41 32 344 43 01

info@mpsag.com; www.mpsmicrosystems.com

MPS develops and manufactures electro-mechanical microsystems used in different fields of applications such as Medical, Automation, Optics, Aerospace and Science. MPS microsystems are characterized by their miniaturization, their very accurate and smooth movement (even over long distances), their extremely low friction and their extreme stiffness. More specifically MPS technology suits very well the requirements for high performance active optics. Contact: Grégoire Bagnoud, Director Business Development, gregoire.bagnoud@mpsag.com; Peter Brombach, Sales Manager, peter.brombach@mpsag.com

**neaspec GmbH**

Eglfinger Weg 2, Haar, Bavaria, 85540 Germany

+49 89 420 797 20-300; fax +49 89 420 797 20-399

sales@neaspec.com; www.neaspec.com

**Featured Product: neaSNOM/nano-FTIR near-field optical microscope**

See the nanoworld: neaspec GmbH is the world-leading manufacturer of ultra-stable & easy-to-use near-field and advanced optical imaging and spectroscopy tools that can be used for microscopy and spectroscopy at the 10-nanometer scale. The company was founded in 2007 by the pioneers of nanoscale infrared microscopy to revolutionize nanoscale analytics, with the ultimate goal to enable technological & scientific progress in every lab around the world. Contact: Tobias Gokus, Application Engineer, tobias.gokus@neaspec.com
Newport Corporation

1791 Deere Ave, Irvine, CA, 92606-4814 (USA)
+1 949 863 3144; fax +1 949 253 1680
sales@newport.com; www.newport.com

Newport is a brand within the MKS Instruments Light & Motion division. The Newport product portfolio consists of a full range of solutions including motion control, optical tables and vibration isolation systems, photonics instruments, optics and opto-mechanical components. For more information, visit www.newport.com. Contact: Derrick Peterman, Derrick.Peterman@us.ophiropt.com

NKT Photonics Inc.

3514 N Vancouver Ave Ste 310, Portland, OR, 97227-2026 (USA)
+1 503 444 8404; fax +1 503 914 1664
sales-us@nktphotonics.com; www.nktphotonics.com

Featured Product: KOHERAS HARMONIK single-frequency ultra-narrow linewidth 780nm fiber laser <7W, robust & reliable

NKT Photonics is the leading supplier of high-performance fiber lasers, fiber optic sensing systems, and photonic crystal fibers. Our main markets are within imaging, sensing and material processing. Our products include ultrafast lasers, supercontinuum white light lasers, low noise fiber lasers, distributed temperature sensing systems and a wide range of specialty fibers. NKT Photonics has its headquarters in Denmark with sales and service worldwide. NKT Photonics is wholly owned by NKT A/S. Contact: Dave Stockwell, Sales Manager, Dave.Stockwell@nktphotonics.com; Min Chen, Senior Sales Manager, min.chen@nktphotonics.com

NM Laser Products, Inc.

337 Piercy Rd, San Jose, CA, 95138-1403 (USA)
+1 408 227 8299; fax +1 408 227 8265
sales@nm laser.com; www.nmlaser.com

Featured Product: HI-LIDT, Next generation LASER SHUTTER Technology, w/patented broadband absorbing diamond Technology

Laser shutter development, manufacture and sales. OEM Specialist; 30 years + refining technical solutions for high irradiance lasers. Safety interlocks, processing shutters and pulse gating models. For average powers to hundreds of watts and fluence levels to 10 J/cm2. Highly integrated and compact solutions achieving laser industry requirements such as damage threshold, thermal gradients/flow, particle generation, out-gassing, photo-chemical material changes, and fail-safe closure. Contact: David Woodruff, Sales Engr., sales@nmlaser.com; Nilam Patel, Sales Associate, nilam@nmlaser.com

Novus Light Technologies Today

PO Box 272574, Ft. Collins, CO, 80527-2574 (USA)
+1 970 672 1109
info@novustoday.com; www.novuslight.com

Novus Light Technologies Today is an online publication that offers expert commentary, industry perspective and vital on-line discussions on a comprehensive list of photonics subjects: optics, automation, electronics, lasers, MEMs/Nanotech, LEDs, imaging and machine vision, photovoltaics, displays and cameras. Contact: Ron Sherwood, Senior Account Manager, ron.sherwood@novustoday.com

nPoint, Inc.

3030 Laura Ln Ste 100, Middleton, WI, 53562-1872 (USA)
+1 608 824 1770; fax +1 608 824 1774
info@npoint.com; www.npoint.com

Featured Product: RXY20-476 tip/tilt stage provides 20mrad of fast, precise, and frictionless motion

nPoint, Inc. designs and manufactures nano-positioning tools for OEM applications. Products include piezo-actuated flexure stages and digital control electronics. Nano-positioning systems provide closed-loop translation in the X, XY, XYZ and tip/tilt. Enables high-speed, high-resolution, sub-nanometer precision for optics, semiconductor, defense, aerospace and bio-industries. Contact: Katerina Moloni, VP Product Development, katerina.moloni@npoint.com

NTFL

13824 Magnolia Ave, Chino, CA, 91710-7027 (USA)
+1 909 591 0276; fax +1 909 902 1638
sales@newportlab.com; www.newportlab.com

Featured Product: UV/VIS/IR Custom Coatings - Plasma Enhanced Magnetron Sputtering & Ion Assisted E-Beam

Newport Thin Film Laboratory, Inc. (NTFL) is a leading manufacturer of superior optical thin film coatings. For more than four decades, custom thin film coatings produced by NTFL have contributed to engineering progress worldwide. NTFL is a fully equipped cleanroom coating facility specializing in the design and manufacture of vacuum deposited optical thin films used in the ultraviolet, visible and infrared spectrum. We can accommodate optics up to 1370mm Dia. ISO 9001:2015 & ITAR Registered. Contact: Ever Mata, Director of Sales & Marketing, emata@newportlab.com; P. Scott Powers, Director of Engineering, pspowers@newportlab.com

Ohara Corp.

23141 Arroyo Vista Ste 200, Rancho Santa Margarita, CA, 92688-2613 (USA)
+1 949 858 5700; fax +1 949 858 5455
sales@oharacorp.com; www.oharacorp.com

Manufacturer of precision optical glasses: strip/slab, cut/molded blanks, high homogeneity blanks, fine gobs, polished ball lenses, near uv transmitting i-Line glass, glass ceramic substrates, CaF2, UV & IR materials, quartz, fused silica (standard and excimer grade). Ohara ClearCeram-Z ultralow expansion glass (excellent CTE uniformity; large sizes). Nanoceram. Supplier of double side polished substrates (excellent flatness/low surface roughness). Contact: Brion Hoffman, President, brionhoffman@oharacorp.com; Chris Ghio, Director of Sales, chrisghio@oharacorp.com

NTFL #422

Newport Thin Film Laboratory, Inc. (NTFL) is a leading manufacturer of superior optical thin film coatings. For more than four decades, custom thin film coatings produced by NTFL have contributed to engineering progress worldwide. NTFL is a fully equipped cleanroom coating facility specializing in the design and manufacture of vacuum deposited optical thin films used in the ultraviolet, visible and infrared spectrum. We can accommodate optics up to 1370mm Dia. ISO 9001:2015 & ITAR Registered. Contact: Ever Mata, Director of Sales & Marketing, emata@newportlab.com; P. Scott Powers, Director of Engineering, pspowers@newportlab.com

Ophir

3050 N 300 W, North Logan, UT, 84341 (USA)
+1 949 863 3144
sales@us.ophiropt.com; www.ophiropt.com/laser-measurement

Ophir is a brand within the MKS Instruments Light & Motion division. The Ophir product portfolio consists of laser and LED measurement products including laser power and energy meters, beam profilers, high-performance IR thermal imaging lenses and optics for CO2 and high-power fiber laser applications. For more information, visit www.ophiropt.com. Contact: Derrick Peterman, Derrick.Peterman@us.ophiropt.com
What excites you about optics and photonics?

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EXHIBITOR DIRECTORY

Optical Perspectives Group, LLC #124
7011 E Calle Tolosa, Tucson, AZ, 85750-2532 (USA)
+1 520 529 2950
reparks@optiper.com; www.optiper.com

Featured Product: Center precision optics without a rotary table using the Axicon Centering Station

Optical Perspectives Group is an opto-mechanical engineering consulting company with expertise in the practical, hardware side of optics. OPG can help with issues such as test and inspection of components as well as assembly and alignment of optical systems. In addition, OPG sells the Point Source Microscope (PSM), an autostigmatic microscope that aids in optical system alignment and the Axicon Centering Station for centering precision optics without the need of a precision rotary table. Contact: Robert Parks, President, reparks@optiper.com

Optical Systems Design, LLC #122
8987 E Tanque Verde Rd Ste 309-1014, Tucson, AZ, 85749-9399 (USA)
+1 520 288 8816
info@osdoptics.com; www.osdoptics.com

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optics.org is the leading online resource for professionals working and using photonics based technologies. Targeted towards OEM markets, optics.org delivers the latest photonics business news, market trends and product applications. You can also find the latest photonics jobs, events and a comprehensive buyers guide. With thousands of users visiting the site every month it is an effective place to find news and get your products to market. Contact: Robert Fisher, Head of Sales & Marketing, optics.org, rob.fisher@optics.org

Optik + #610
Leiferder Weg 44a, Braunschweig Niedersachsen, 38122 Germany
+49 531 2379497; fax +49 531 2379601
info@optik-plus.de; www.optik-plus.de

Featured Product: Spherical lenses, aspherical lenses and cylindrical lenses, optical prisms, windows, mirrors

OPTIK + is a family-owned company based in Braunschweig/Germany, which specializes in manufacturing in a wide range of high-precision optical components as well as spherical, aspherical and cylindrical lenses from 5-120mm diameter. Also we manufacture laser optics, optical prisms, windows and mirrors. Nearly all glass types of the companies SCHOTT, OHARA and CDGM as well as quartz glass, CaF2 and germanium are processed. All optical components can be coated according to customer requirements. Contact: Michael Sandelmann, Owner, info@optik-plus.de; Yannik Sandelmann, y.sandelmann@optik-plus.de

Optikos Corp. #528
Bldg 3, 107 Audubon Rd, Wakefield, MA, 01880-1245 (USA)
+1 617 354 7557; fax +1 617 354 5946
sales@optikos.com; www.optikos.com

Featured Product: LensCheck™ System

The Optical Engineering Experts®--Optikos develops and manufactures standard and custom metrology products for measuring lenses, camera systems and ophthalmic components; and offers in-house IQ Lab™ testing and qualification services. Our engineering teams provide expert design and manufacturing for optically-based product development in any industry or application, including medical devices and diagnostics, aerospace and defense, automotive and consumer electronics. Contact: George Meyer, Key Account Manager, gmeyer@optikos.com; Byron Seabolt, Key Account Manager, bseabolt@optikos.com

Optimax Systems, Inc. #638
6367 Dean Pkwy, Ontario, NY, 14519-8939 (USA)
+1 585 265 1020; fax +1 585 265 1033
sales@optimaxsi.com; www.optimaxsi.com

Featured Product: Optics for High Power: precision optics for Directed Energy, DUV systems and HEL

Optimax is America’s largest optics manufacturer. On the cutting edge of future applications, Optimax implements an engineered solutions approach to help our customers achieve breakthroughs in the aerospace, defense, semiconductor, research, and medical industries. Optimax has a wide range of capabilities to support your programs, including aspheres, cylinders, freeforms, prisms, spheres, and advanced e-beam, APS, IAD, and IBS coatings. Contact: Joe Spilman, Director of Sales & Marketing, sales@optimaxsi.com
OptiPro Systems #829

OptiPro Systems, located in Rochester, NY, has over 35 years of experience designing and manufacturing precision optical fabrication machines and metrology systems. OptiPro develops cutting edge machines for a variety of precision optics, including spheres, aspheres, freeforms, aspheric cylinders, torics, and more. These solutions are designed to yield prototype to high volume production of parts manufactured from a range of materials including optical glasses, ceramics, crystals, and alloys. Contact: Ron Colavecchia, Director of Optics Technology, rcolavecchia@optipro.com; Mike Bechtold, President, mike@optipro.com

Opto-Alignment Technology, Inc. #612

Opto Alignment is a leading manufacturer of ultra-precision alignment, assembly and inspection optical systems. Our flagship product, the Laser Alignment & Assembly Station (LAS), employs latest generation illumination and vision technologies, along with computer automation, to achieve sub-micron centering precision. 2019 brings the introduction of our most advanced product offering, 3D Profiling tools developed with a high performance-to-price ratio for a wide range of applications. Contact: Ron Garden, Chief Technology Officer, ron.garden@optoalignment.com; Mark Green, Optical Engineer, mark.green@optoalignment.com

Bench Top LAS with non-contact option to measure tilt of aspheric lenses for precision alignment.

OptoSigma Corp. #433

OptoSigma has been a leader in thin film coatings, opto-mechanics, manual and motorized positioning components and optical components for more than 20 years. We’re committed to providing unrivaled service and engineering insight for our customers on every product we offer. Our global manufacturing prowess enables us to offer the best selection from stock while handling custom orders of all types and quantities. Discover why thousands of customers worldwide rely on OptoSigma. Contact: Dan Denison, Sales Manager, sales@optosigma.com

Our long working distance apochromatic objectives are ideal for life science & cold atom research.

OptoTech Optical Machinery Inc. #112

OptoTech is a German based company of the Schunk Group, offering the most comprehensive product range in the field of optics manufacturing equipment. We supply optics processing centers for grinding, polishing and centering/edging, correction polishing machines, measuring technology, as well as alignment and joining technologies. Whether round optics, plano optics, aspherals, cylinders or freeform surfaces from Ø 1 mm to 2000mm. OptoTech offers cutting edge technology, tooling and service. Contact: John Meyer, Sales Manager Precision Optics North America, j.meyer@optotech.us; Matthias Pfaff, Division Manager Precision Optics, m.pfaff@optotech.de

OSELA Inc. #628

Osela is a specialized manufacturer of laser illumination systems and structured lighting for industrial applications in machine vision, life sciences and research. With an experienced and skilled staff knowledgeable in the area of beam shaping optics and lasers allows us to continually innovate our product portfolio offering to our customers. Based on our standard platform and our expertise, we offer very competitive customized solution specific to the needs of our customers.
EXHIBITOR DIRECTORY

SPONSOR

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219 Westbrook Rd,
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+1 613 831 0981; fax +1 613 836 5089
sales@ozoptics.com; www.ozoptics.com

High power components/isolators/combiners/patchcords/connectors/ intelligent tunable laser diode sources/safety interlocks/shutters/optical coatings, laser to fiber delivery components, adjustable collimators/ focusers, pm/sm/mm fused fiber couplers, pm patchcords/connectors/ splitters/switch, polarized sources, polarization rotators/controllers/ analyzers, polarizers, pdl emulators, extinction ratio meter, turnkey laser diode sources, hermetically sealable patchcords, fiber optic sensors oz- pen. Contact: Omur Sezerman, CEO & President, sales@ozoptics.com

PerkinElmer, Inc. #812
940 Winter St, Waltham, MA, 02451 (USA)
+1 203 925 4602; fax +1 203 944 4904
info@perkinelmer.com; www.perkinelmer.com

PerkinElmer, Inc. is a global leader focused on improving the health and safety of people and their environment. With our analytical instrumentation, and leading laboratory services, we focus on improving the integrity and safety of the world we live in.

PHASICS Corp. #912
11th Fl, 600 California St, San Francisco, CA, 94108 (USA)
+1 415 610 9741
contact@phasics.com; www.phasicscorp.com

Featured Product: Kaleo MultiWave - TWE and RWE of coated optics at their design wavelength

Phasics offers high resolution wavefront sensors (up to 120 000 phase pixels) from deep UV to far-IR. Its patented technology ensures both accurate measurements and ease of use. In laser facilities, a single instrument covers beam test, adaptive optics with any deformable mirror and plasma diagnosis. For lens metrology, it provides on- and off-axis MTF and aberrations at several wavelengths on a same easy-to-align bench. Contact: Valentin Genuer, Business Developer, contact@phasics.com

Kaleo MultiWave: TWE and RWE of coated optics at their design wavelength over large diameters.

Photon Engineering LLC #417
310 S Williams Blvd No 222,
Tucson, AZ, 85711 (USA)
+1 520 733 9557; fax +1 520 733 9609
info@photonengr.com; www.photonengr.com

Featured Product: FRED Optical Engineering software

Photon Engineering, LLC is a consulting and software development firm based in Tucson, Arizona. Photon Engineering develops and markets FRED, the premier proven software to solve today’s challenging optical engineering problems. Users working within FRED’s 3D virtual prototyping CAD environment can model and analyze virtually any optomechanical system containing arbitrary coherent, incoherent, and partially coherent sources. Engineering consulting and short courses are offered worldwide. Contact: Donata Pfisterer, Sales manage, donatap@photonengr.com; Patrick McNelly, VP of Engineering Services, patrickm@photonengr.com

Photonic Cleaning Technologies #832
Bldg 1, 1895 Short Ln, Platteville, WI, 53818-8977 (USA)
+1 608 467 5396; fax +1 608 467 5397
sales@photoniccleaning.com; www.photoniccleaning.com

Featured Product: First Contact Polymers™. Only no-residue strip coat available to clean & protect sensitive surfaces

Manufacturer of First Contact Polymers™. The cleaning and protection system. Apply liquid polymer and peel the dried film leaving the surface nearly atomically clean. Independent xps/esca and laser damage threshold testing shows no residue to the molecular level! Safe with high power laser optics. Remove dust & fingerprints. Reduce waste: non-toxic inert polymers. Clean nanostructures, gratings & phase masks! Protect and clean microscope objectives & ccd sensors. Safe. Low adhesion. No residue. Contact: David Giesen, Operations and Manufacturing Manager, davidg@photoniccleaning.com; James Hamilton, CTO, hamiltonj@photoniccleaning.com

NEW! First contact DTC polymer. For copper & other metal optics. Safe. No residue. Atomically clean!
Photonics Media #823

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info@photonics.com; www.photonics.com

Featured Product: Photonics Spectra magazine; covering the science and industry of photonics. Subscribe for free

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Photonics Online #611

5340 Fryling Road, Erie, PA, 16510 (USA)
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info@photonicsonline.com; www.photonicsonline.com

At Photonics Online, our goal is to keep our readers apprised of the various innovative applications of light. These applications range from high-level scientific endeavors — such as the detection of gravitational waves and the newest advancements in quantum systems — to more commercially applicable topics, such as advancement in solar cell technology, scientific cameras for research and development, and sensors for integration into automobiles and other platforms. Contact: Nathan Miller, Business Development Manager, nmiller@vertmarkets.com; Ed Biller, Editor, ebiller@vertmarkets.com

Physics Today #442

One Physics Ellipse, College Park, MD, 20740-3843 (USA)
+1 301 209 3000
physicstoday.org

Featured Product: Physics Today Magazine

Physics Today is the most influential and closely followed physics magazine in the world. Join the community of more than 115,000 scientists and engineers engaging with the content every month. A subscription is just $25/year at www.physicstoday.org/subscribe. Contact: Christina Unger Ramos, Marketing & Sales Manager, cunger@aip.org

Precision Glass & Optics #345

PIE Corporate Member
3600 W Moore Ave, Santa Ana, CA, 92704-6835 (USA)
+1 714 540 0126; fax +1 714 540 1482
info@pgo.com; www.pgo.com

Featured Product: NEW! PG&O fabricates finished optics out of infrared (IR) materials that operate from 0.75μm - 1μm

PG&O® provides precision thin film coatings, standard optics, complex assemblies & customized optical solutions for medical, military, imaging, industrial instrumentation, avionics, commercial applications and more. The company introduces a new fabrication capability, offering finished infrared (IR) optics from a variety of infrared materials, including calcium fluoride, zinc selenide, zinc sulfide, germanium, magnesium fluoride, & silicon. The IR materials available operate from 0.75μm to 15μm. Contact: Dan Bukaty, Jr., President, danjr@pgo.com

NEW! PG&O fabricates finished optics out of infrared (IR) materials that operate from 0.75μm - 1μm.
Precision Optical
320 Kalmus Dr, Costa Mesa, CA, 92626-6045 (USA)
+1 949 631 6800; fax +1 949 642 7501
sales@precisionoptical.com; www.precisionoptical.com

Featured Product: Custom Prisms, Large Optical Window/Mirrors, Corner Cube Retroreflector, Porro Prism, Alignment Cube

Precision Optical offers a diverse portfolio of capabilities for production of precision optical components. With reliable, efficient strategies for manufacturing many different prism shapes, sizes, materials, thin film coatings and assemblies, prototype to production. The company's success has been our commitment to expanding capabilities in all areas of optical component fabrication, giving Precision Optical unsurpassed process control and flexibility in responding to our customer requirements.

Contact: Jeremy Gordon, Vice President of Sales & Marketing, jgordon@precisionoptical.com; James McClure, Sales Manager, jmcclure@precisionoptical.com

Qual Diamond Hi-Tech
1 2707 High Bluff Dr Ste 200, San Diego, CA, 92130-2037 (USA)
+1 858 350 4253
info@qualdiamond.com; www.qualdiamond.com

Quantum Design
10307 Pacific Center Ct, San Diego, CA, 92121 (USA)
+1 858 481 4400; fax +1 858 481 7410
info@qdusa.com; www.qdusa.com

Quartus Engineering Inc.
9689 Towne Centre Dr, San Diego, CA, 92121-1964 (USA)
+1 858 875 6000; fax +1 858 875 6001
sales@quartus.com; www.quartus.com

Quartus Engineering is a solutions provider with competencies in finite element analysis, opto-mechanical design, system development, and prototype/low quantity builds, with experience with laser communication, LiDAR, camera calibration, factory automation and beyond. Quartus provides complete systems, component design/analysis, or integrate with an existing team to supplement expertise. Quartus has capabilities in STOP analysis and simulation-driven design of complex optical systems.

Contact: Alex Halterman, Engineering Manager, alex.halterman@quartus.com
EXHIBITOR DIRECTORY

R Specialty Optical Fibers LLC  #710
SPIE  Corporate Member
5248 Olde Towne Rd Ste 12-13, Williamsburg, VA, 23188-1986 (USA)
+1 757 645 2911
lyoung@rsofibers.com; www.rsofibers.com

Rainbow Research Optics, Inc.  #538
SPIE  Corporate Member
6830 S Dawson Cir, Centennial, CO, 80112-4208 (USA)
+1 303 371 3000; fax +1 303 371 1333
sales@rr-optics.com; www.rr-optics.com
Featured Product: Custom Optics and Coatings
Rainbow Research Optics is a custom optics manufacturer in Denver, Colorado. We manufacture optics and coating from customer supplied designs and drawings. Please contact us for a quote on your desired optics. We are ITAR registered and ISO 9001:2015 Certified. We will quote quantities from 1 through 20,000. Our 30,000 sq. ft. facility and 65 employees are standing by to assist you with every aspect of your optical component and assembly needs. Contact: Eli Bruner, Director of Sales and Marketing, e.bruner@rr-optics.com; Mark Chan, Senior Sales Engineer, m.chan@rr-optics.com

Rigaku Innovative Technologies, Inc.  #827
SPIE  Corporate Member
1900 Taylor Rd, Auburn Hills, MI, 48326-1740 (USA)
+1 248 232 6400; fax +1 248 232 6500
Optics@rigaku.com; www.RigakuOptics.com
Rigaku designs & delivers high performance multilayer and single layer optics used in commercial, academic institutions & government research facilities. Over 60,000 RIT multilayers are in use worldwide, integrated into most major brands of x-ray diffractometers & x-rays instruments. Contact RIT for optics for Wright laboratory, synchrotrons, x-rays, plasma diagnostics, astronomy, and other energetic applications. Let us engineer coatings for you! Visit booth #827 Contact: Nick Grupido, nick.grupido@rigaku.com

Riverhawk Co.  #634
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info@riverhawk.com; www.riverhawk.com

Rochester Precision Optics, LLC  #416
SPIE  Corporate Member
850 John St, West Henrietta, NY, 14586-9748 (USA)
+1 585 292 5450; fax +1 585 292 5459
bd@rpoptics.com; www.rpoptics.com
Featured Product: Design & engineering, high volume manufacturing, precision molding, glass & plastic, visible & IR
Rochester Precision Optics (RPO) specializes in high volume production of precision glass molded lenses & aspheres, advanced polymer lens molding, IR optics and the design & engineering of precision optical, optomechanical and electro-optical assemblies and sub-systems. Formerly known as Kodak Optical Imaging Systems, Rochester Precision Optics serves defense, consumer electronics, industrial, medical & life sciences markets with complete optical design and manufacturing services. Contact: Joseph D’Ambrosia, Senior Director, Business Development & Marketing, jdambrosia@rpoptics.com; Elizabeth Bubacz, Marketing Coordinator, ebubacz@rpoptics.com
RPO designs & manufactures high-performance SWIR, MWIR and LWIR infrared chalcogenide glass lenses.

Ruda Cardinal, Inc.  #513
SPIE  Corporate Member
3280 E Hemisphere Loop Ste 180, Tucson, AZ, 85706 (USA)
+1 520 546 1495; fax +1 520 546 1481
info@ruda.com; www.ruda.com
Featured Product: Optical System: Vis, Vis-NIR, SWIR, Refractive, Reflective, Catadioptrics, Aspherics
Ruda-Cardinal, Inc. is a leader in the field of Optical Engineering. Specializing in rapid prototyping and creative solutions to unique and complicated optical challenges. From conceptualization to production, RCI offers innovative solutions to any optical design or manufacturing challenge. Using state-of-the-art opto-mechanical design software and testing equipment, RCI ensures the highest degree of quality through all stages of development. Contact: Stuart Singer, Senior Technical Director, ssinger@ruda.com; Kate Medicus, Ph.D., Exe. Vice President, kmedicus@ruda.com

Santec USA Corp.  #930
SPIE  Corporate Member
433 Hackensack Ave, Hackensack, NJ, 07601 (USA)
+1 201 488 5505; fax +1 201 488 7702
info@santec.com; www.santec.com
Featured Product: Tunable Lasers & Spatial Light Modulators
Santec is a leading manufacturer of tunable lasers, swept source coherent equipment, and Lcos spatial light modulators. Optimized for test and measurement Santec tunable lasers can be configured with polarization control, power meter and software for turnkey wdl & pdl characterization. Lcos spatial light modulators from Santec are delivering high performance to a wide range of applications from scientific research to material processing. Features 10-bit phase control and UV hardened devices. Contact: Jonathan Evans, VP, Global Sales Group, jonathan@santec.com; Max Chang, Director, Global Sales Group, max@santec.com

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Schrödinger, LLC
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Schrödinger is a leading provider of advanced molecular simulations and enterprise software solutions and services for its clients, which include all major pharmaceutical and biotechnology companies worldwide, as well as leading materials science researchers. Founded in 1990, Schrödinger has nearly 300 employees and operations in the United States, Europe, Japan, and India, as well as business partners in China and Korea.

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+1 614 486 0261; fax +1 614 486 0912
sales@targetmaterials.com; www.sci-engineered-materials.com
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SCI Engineered Materials is a global supplier and manufacturer of advanced materials for PVD thin film applications. Through partnerships with end users and OEM's, SCI develops innovative and customized solutions enabling commercial success. We serve the optic, photonic, solar, media storage, photovoltaic, displays, and semiconductor industries. Contact: Eric Massey, Sales Rep., emassey@sciengineeredmaterials.com
Magnesium Fluoride (MgF2) forms:-sputtering targets- evaporation pieces.

sci a Systems GmbH
Annaberger Str 240, Chemnitz, Saxony, 09125 Germany
+49 371 5347 780; fax +49 371 5347 781
info@scia-systems.com; www.scia-systems.com
Featured Product: sci a Finish 1500 - Final surface form error correction on large area optics with Angstrom precision
sci a Systems is a full range supplier of advanced ion beam and plasma processing equipment. The systems are applicable for coating and etching processes in the production of microelectronics, MEMS and precision optical components. Due to their flexible and modular design, the systems can be configured according to customer specific requirements. Amongst others by combining several vacuum process chambers into cluster or in-line solutions. Contact: Allan Biega), Sales Representative Americas, sales@scia-systems.com

Sia Armadillo
1111 Elko Dr., Ste D, Sunnyvale, CA, 94089 (USA)
+1 408 834 7410
info@armadillosia.com; www.armadillosia.com
Featured Product: Leader in silica optical fibers, assemblies, bundles and hybrid photonics solutions
Exclusive supplier of specialized fiber optics and hybrid photonic solutions. Our manufacturing plants are completely vertically integrated; raw material preform production, fiber drawing & sub-assembly manufacturing (pig-tails and patch cords to custom fiber bundles & fused ends solutions). * Fibers with 40 - 2,000 μm core * N.A. range 0.12 - 0.53 * Range of applications from 180 - 2500nm in wavelength * Non-circular core fibers * Assemblies for challenging applications Contact: Ilya Rotenstein, Business Development, ilya@armadillosia.com; Aleksander Yam, Operation Management, ayam@armadillosia.com
Our multi-core concentric fibers, excellent for high power laser cutting and industrial applications.

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sales@sierraoptics.com; www.sierraoptics.com
Flatwork-Plano Optics (Filters, Panels, Windows, Mirrors, Beam Splitters, Wedges and Prisms) Spherical Lens and Cylindrical Lens. Our specialties include Cylindrical Optics UV, VIS, IR. Laser Components, Laser Flow Tubes and Custom Shaped Optics. Contact: Russ Lowe, Sales & Marketing Manager, rlowe@sierraoptics.com

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+1 541 479 8697; fax +1 541 479 3314
reception@siskiyou.com; www.siskiyou.com
Siskiyou Corporation manufactures motion control devices with manual and computer interfaced controllers, translation stages, mirror mounts, lens positioners, adjustment screws, construction hardware, fiber grippers and other opto-mechanical components for use in research and manufacturing. Siskiyou Corporation will also custom tailor devices to fit your needs. Contact: Theeya Howell, Tradeshow Event Coordinator, reception@siskiyou.com
SmarAct Inc. #617
2140 Shattuck Ave Ste 1103, Berkeley, CA, 94704 (USA)
+1 415 766 9006
info-us@smaract.com; www.smaract.com

Featured Product: SmarPod: a compact and high-precision 6DoF platform with parallel kinematics for optical alignment

SmarAct is a fast-growing and innovative company, specialized in the development and production of customizable micro- and nano-positioning systems. Our broad portfolio, from single stages to miniaturized robots and easy-to-use control systems, is completed by sophisticated metrology based on our powerful laser interferometer. With our in-house production, we can ensure an outstanding level of product quality and flexibility. We are ready to help you find the best solution for your projects.

Contact: Jorge Miguel, info-us@smaract.com

SmarPod, a compact 6DoF parallel-kinematic system for manipulating objects with nanometer resolution.

Spectral Instruments. Inc. #815
420 N Bonita Ave, Tucson, AZ, 85745-2747 (USA)
+1 520 884 8821; fax +1 520 884 8803
info@specinst.com; www.specinst.com

CMOS cameras for ultra-high performance scientific application are shown by Spectral Instruments. Our expertise in CCD camera development provides the background for the finest in cooled, state of the art, CMOS camera platforms supporting large area, front and back illuminated, high Q.E. sensors. We can detect visible, UV, X-ray radiation, and electrons. Configurations include standard windows, fiber optic tapers or faceplates. Custom camera and sensor designs for OEM applications are available.

Spectrogon US, Inc. #916
115 Route 46 W Ste A2, Mountain Lakes, NJ, 07046 (USA)
+1 973 331 1191; fax +1 973 331 1373
sales.us@spectrogon.com; www.spectrogon.com

Featured Product: Visible and Infrared Optical Filters

Spectrogon specializes in the design and manufacture of optical filters, thin film coatings, and optical components for analytical, medical, and scientific applications. Spectrogon is the world leader in the design and manufacture of Holographic Diffraction Gratings for laser compression/stretching applications, tuning and spectroscopic instruments. Spectrogon offers a huge inventory of stock filters (www.spectrogon.com) that can ship within 2 weeks. Contact: Steve Finn, Sales Manager, steve.finn@spectrogon.com; Kelly Neeb, Sales Admin, sales.us@spectrogon.com
Spectroscopy
485F US Hwy 1 S Ste 210, Iselin, NJ, 08830-3072 (USA)
+1 203 523 7067
spectroscopyedit@ubm.com; www.spectroscopyonline.com

Featured Product: Spectroscopy
Spectroscopy's mission is to enhance productivity, efficiency, and the overall value of spectroscopic instruments and methods as a practical analytical technology across a variety of fields. Scientists, technicians, and laboratory managers gain proficiency and competitive advantage for the real-world issues they face through unbiased, peer-reviewed technical articles, trusted troubleshooting advice, and best-practice application solutions. Contact: Melissa Devlin, Marketing Manager, melissa.devlin@ubm.com; Stephanie Shaffer, Publisher, stephanie.shaffer@ubm.com

StellarNet, Inc.
14390 Carlson Cir, Tampa, FL, 33626-3003 (USA)
+1 813 855 8687; fax +1 813 855 0394
contactus@stellarnet.us; www.stellarnet.us

Featured Product: SMART-Control device offers an integrated CPU and options for different communication protocols
StellarNet, Inc. provides high performance compact spectrometer systems and software for product analysis, research, education, and OEM. StellarNet instrumentation is rugged for any environment - lab, process, or field. Spectrometer accessories include light sources, sampling fixtures, optical fibers, and probes. Applications include absorbance & transmission (190-2300 nm), fluorimetry, optical metrology, thin film, reflectance & colorimetry, LED/Laser/Solar spectral analysis, LIBS, OES, & Raman.

Synopsys, Inc.
690 E Middlefield Rd, Mountain View, CA, 94043-4010 (USA)
+1 650 584 5000; fax +1 650 584 4102
info@synopsys.com; www.synopsys.com

Featured Product: CODE V®, LightTools®, LucidShape®, RSoft™, PIC Design Suite
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info.tseso@fr.thalesgroup.com; www.seso.com

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MPS Micro Precision Systems AG
Optical Perspectives Group, LLC
Photonic Cleaning Technologies
Precision Glass & Optics
Rainbow Research Optics, Inc.
Riverhawk Co.
Sia Armadillo
Thermo Fisher Scientific Inc.
Vincent Associates

BASIC RESEARCH, SCIENCE
ALPAO S.A.S.
Andor Technology Ltd.
Applied Surface Technologies
Arete Associates
attocube systems Inc.
Enli Technology Co., Ltd.
Hamamatsu Corp.
Heidelberg Instruments Inc.
Hinds Instruments, Inc.
INO
Inrad Optics
J.A. Woollam
KOHZU Precision & LAB Motion
Systems c/o Daniel F Crews, LLC
Laser Quantum Inc.
Luxel Corp.
Mad City Labs., Inc.
Meadowlark Optics, Inc.
Micro Laser Systems, Inc.
MilliporeSigma
neaspec GmbH
NM Laser Products, Inc.
OptoSigma Corp.
OZ Optics Ltd.
Photonics Media
piezosystem jena, Inc.
Precision Glass & Optics
Ruda Cardinal, Inc.
sca Systems GmbH
Sia Armadillo
Syntec Optics
Thermo Fisher Scientific Inc.
Universal Photonics Inc.
VIAVI Solutions Inc.
Vincent Associates
Wordingham Technologies
Zaber Technologies Inc.

CAMERAS AND IMAGING SYSTEMS
4D Technology Corp.
All Flex Flexible Circuits and Heaters
ALPAO S.A.S.
Amsterdam Scientific Instruments B.V.
Andor Technology Ltd.
Andover Corporation
Chroma Technology Corp.
Hamamatsu Corp.
INO
Navitar Inc.
Optikos Corp.
PHASICS Corp.
Photonics Cleaning Technologies
Riverhawk Co.
Syntec Optics
Thermo Fisher Scientific Inc.
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DATA PROCESSING
Accumold
All Flex Flexible Circuits and Heaters
Himax IGI Precision
Inrad Optics
Isuzu Glass, Inc.
Laser Components USA, Inc.
Millennium Optical System Co., Ltd.
Navitar Inc.
Optikos Corp.
PRODUCT CATEGORIES

ELECTRICAL/SIGNAL ANALYSIS EQUIPMENT
ADIT Electron Tubes
All Flex Flexible Circuits and Heaters

ELECTRONIC COMPONENTS
Accumold
ADIT Electron Tubes
All Flex Flexible Circuits and Heaters
Laser Components USA, Inc.
NM Laser Products, Inc.
Siskiyou Corporation

ELECTRONIC, DIGITAL IMAGING
ALPAO S.A.S.
piezosystem jena, Inc.
Siskiyou Corporation

EMERGING PHOTONICS TECHNOLOGIES
ALIO Industries Corp.
MilliporeSigma

FIBER OPTICS AND ACCESSORIES
Accumold
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Applied Surface Technologies
Energetiq Technology, Inc.
GPD Optoelectronics Corp.
Himax IGI Precision
Isuzu Glass, Inc.
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Navitar Inc.
OZ Optics Ltd.
piezosystem jena, Inc.
Sia Armadillo
SmarAct Inc.
StellarNet, Inc.

INDUSTRIAL SENSING AND MEASUREMENT
All Flex Flexible Circuits and Heaters
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LASER COMPONENTS AND ACCESSORIES
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Inrad Optics
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Isuzu Glass, Inc.
LaCroix Precision Optics
Laser Quantum Inc.
Luxel Corp.
Meadowlark Optics, Inc.
Millennium Optical System Co., Ltd.
MPS Micro Precision Systems AG
NM Laser Products, Inc.
OZ Optics Ltd.
PHASICS Corp.
Photonics Cleaning Technologies
piezosystem jena, Inc.
Riverhawk Co.
Sia Armadillo
Vincent Associates

LASER INDUSTRY
ALIO Industries Corp.
Arete Associates
Diverse Optics Inc.
Inrad Optics
Laser Quantum Inc.
LightTrans International UG
Millennium Optical System Co., Ltd.
MPS Micro Precision Systems AG
NM Laser Products, Inc.
OptoSigma Corp.
Photonics Cleaning Technologies
Photonics Media
Rainbow Research Optics, Inc.
SmarAct Inc.
Zaber Technologies Inc.

LASERS AND SYSTEMS
ALIO Industries Corp.
Arete Associates
Hamamatsu Corp.
INO
Laser Components USA, Inc.
Laser Quantum Inc.
Micro Laser Systems, Inc.
OZ Optics Ltd.
YSL Photonics

LED, OLED, NON-LASER LIGHT SOURCES
Chroma Technology Corp.
Energetiq Technology, Inc.
GS Plastic Optics
Hamamatsu Corp.
Laser Quantum Inc.
OZ Optics Ltd.

LIGHTING AND ILLUMINATION
Energetiq Technology, Inc.
Enli Technology Co., Ltd.
Himax IGI Precision
Infinite Optics Inc.
Isuzu Glass, Inc.
Lambda Research Corp.
LightTrans International UG
Moulded Optics GmbH
Sia Armadillo
StellarNet, Inc.
Synopsys, Inc.

MACHINE VISION, FACTORY AUTOMATION
4D Technology Corp.
ADIT Electron Tubes
ALIO Industries Corp.
Âpre Instruments, Inc.
INO
Laser Quantum Inc.
Mad City Labs, Inc.
NM Laser Products, Inc.
Ruda Cardinal, Inc.

MATERIALS PROCESSING, LASERS IN MANUFACTURING
attocube systems Inc.
Inrad Optics
IRD Glass
Laser Components USA, Inc.
OZ Optics Ltd.
Photonics Cleaning Technologies
Riverhawk Co.
Sia Armadillo
YSL Photonics

MATERIALS, ABRASIVES, CHEMICALS
DCM Tech, Corp.
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Inrad Optics
MilliporeSigma
OptoTech Optical Machinery Inc.
Photonic Cleaning Technologies
Universal Photonics Inc.

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attocube systems Inc.
Bruker Nano, Inc.
Mad City Labs, Inc.
Millennium Optical System Co., Ltd.
Navitar Inc.
nespec GmbH
Optical Perspectives Group, LLC
piezosystem jena, Inc.
Riverhawk Co.
Sia Armadillo
Vincent Associates
Vision Engineering Inc. (incl. Vision Optics division)
Zygo Corporation

MICROTECHNOLOGY
3D AG
Accumold
Heidelberg Instruments Inc.
INO
Meadowlark Optics, Inc.
MPS Micro Precision Systems AG
SmarAct Inc.

MISC CONSUMABLES AND EQUIPMENT
Applied Surface Technologies
Photonic Cleaning Technologies
SPIE Career Center

MOUNTS, TABLES, VIBRATION ISOLATION
Navitar Inc.
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NANOTECHNOLOGY PRODUCTS
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nespec GmbH

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LaCroix Precision Optics
LightTrans International UG
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Millennium Optical System Co., Ltd.
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Navitar Inc.
Optik +
OptoSigma Systems, Inc.
OptoSigma Corp.
Precision Glass & Optics
Rainbow Research Optics, Inc.
Ruda Cardinal, Inc.
Syntec Optics
Taiyo Optics (Dong Guan) Corp.
Vision Engineering Inc. (incl. Vision Optics division)
Zygo Corporation

OPTICAL DESIGN AND ENGINEERING
Andover Corporation
Arete Associates
Chroma Technology Corp.
Coursen Coating Labs, Inc.
Diverse Optics Inc.
Enli Technology Co., Ltd.
GS Plastic Optics
Himax IGI Precision
INO
Lambda Research Corp.
LightTrans International UG
MPS Micro Precision Systems AG
Navitar Inc.
Optical Perspectives Group, LLC
Optikos Corp.
Opto-Alignment Technology, Inc.
Photon Engineering LLC
Photons Media
Precision Glass & Optics
Ruda Cardinal, Inc.
SmarAct Inc.
Synopsys, Inc.
Syntec Optics
Vincent Associates
Zygo Corporation

OPTICAL FABRICATION EQUIPMENT
3D AG
Accumold
Andover Corporation
Applied Surface Technologies
DCM Tech, Corp.
Diverse Optics Inc.
Enli Technology Co., Ltd.
J.A. Woollam
OptiPro Systems
Opto-Alignment Technology, Inc.
OptoTech Optical Machinery Inc.
scia Systems GmbH
Universal Photonics Inc.

OPTICS MANUFACTURING
Accumold
ALPAO S.A.S.
Andover Corporation
Äpre Instruments, Inc.
CMO Optic
DCM Tech, Corp.
Diverse Optics Inc.
Energetiq Technology, Inc.
GS Plastic Optics
Hardin Optical Co.
Himax IGI Precision
Infinite Optics Inc.
Inrad Optics
IRD Glass
J.A. Woollam
KOHZU Precision & LAB Motion Systems c/o Daniel F Crews, LLC
LaCroix Precision Optics
Luxel Corp.
Meadowlark Optics, Inc.
Micro Laser Systems, Inc.
Millennium Optical System Co., Ltd.
Moulded Optics GmbH
Navitar Inc.
NTFL
Optical Perspectives Group, LLC
Optikos Corp.
OptiMax Systems, Inc.
OptiPro Systems
Opto-Alignment Technology, Inc.
OptoSigma Corp.
Photon Cleaning Technologies
Precision Glass & Optics
Rainbow Research Optics, Inc.
Riverhawk Co.
Ruda Cardinal, Inc.
scia Systems GmbH
Taiyo Optics (Dong Guan) Corp.
Zygo Corporation

OPTOMECHANICAL COMPONENTS, DEVICES
ALIO Industries Corp.
Äpre Instruments, Inc.
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INO
MPS Micro Precision Systems AG
Opto-Alignment Technology, Inc.
OptoSigma Corp.
Rainbow Research Optics, Inc.
Vincent Associates
Wordingham Technologies

PHOTONIC INTEGRATION
Micro Laser Systems, Inc.

POSITIONING EQUIPMENT, MOTION CONTROL AND ACCESSORIES
ALIO Industries Corp.
ttocube systems Inc.
HEIDENHAIN Corp.
KOHZU Precision & LAB Motion Systems c/o Daniel F Crews, LLC
Mad City Labs., Inc.
MPS Micro Precision Systems AG
NM Laser Products, Inc.
OptoSigma Corp.
PI (Physik Instrumente) L.P.
piezomotion jena, Inc.
Riverhawk Co.
Siskiyou Corporation
SmarAct Inc.
Zaber Technologies Inc.

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Novus Light Technologies Today
Photonics Media

SEMICONDUCTOR DEFENSE SECURITY
Optimax Systems, Inc.

SEMICONDUCTOR MANUFACTURING
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Heidelberg Instruments Inc.
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Laser Quantum Inc.
NM Laser Products, Inc.
Optimax Systems, Inc.
Rainbow Research Optics, Inc.
Schrödinger, LLC
scia Systems GmbH
SmarAct Inc.
Zaber Technologies Inc.
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Arete Associates
Lambda Research Corp.
LightTrans International UG
Photon Engineering LLC
Schrödinger, LLC
SPIE Career Center
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Enli Technology Co., Ltd.
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J.A. Woollam
Lambda Research Corp.
Luxel Corp.
MilliporeSigma
Moulded Optics GmbH
Opto-Alignment Technology, Inc.
Schrödinger, LLC

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Syntec Optics

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StellarNet, Inc.
Vincent Associates

STRUCTURAL AND INFRASTRUCTURE SENSING
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4D Technology Corp.
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attocube systems Inc.
Bruker Nano, Inc.
Diverse Optics Inc.
Enli Technology Co., Ltd.
HEIDENHAIN Corp.
Hinds Instruments, Inc.
Inrad Optics
J.A. Woollam
Lambda Research Corp.
Mad City Labs., Inc.
Meadowlark Optics, Inc.
Optical Perspectives Group, LLC
Optikos Corp.
OptiPro Systems
Opto-Alignment Technology, Inc.
OptoTech Optical Machinery Inc.
PHASICS Corp.
SmarAct Inc.
StellarNet, Inc.
Vision Engineering Inc. (incl. Vision Optics division)
Wordingham Technologies
Zygo Corporation

VACUUM, COOLING, GAS HANDLING EQUIPMENT
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attocube systems Inc.
HEIDENHAIN Corp.
J.A. Woollam
Mad City Labs., Inc.
Micro Laser Systems, Inc.
scia Systems GmbH
Zaber Technologies Inc.

VEHICLE SENSING AND CONTROL
Accumold
Laser Components USA, Inc.
Moulded Optics GmbH
Optikos Corp.
Riverhawk Co.
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 VIAVI Solutions Inc.
**EQUITY** is access to opportunities, fair treatment, and advancement for all people; it’s about eliminating barriers that prevent the full participation of some groups.

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- Detectors and imaging
- Deep learning
- LiDAR
- Remote sensing
- Nanoscience
- Optics educators

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NEW AND FEATURED COURSES
- Introduction to Fundamental Performance Limits of CCD and CMOS Imagers (James Janesick)
- Optical Measurement of Surface Topography (Peter de Groot)
- Photodetectors – A Practical Selection Guide (Slawomir Piatek)
- Mirror System Design with Freeform Surfaces (José Sasián)

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COURSE INDEX

ADVANCED METROLOGY
Sun SC213  Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $440 / $500 / $275
Sun SC1271  Optical Measurement of Surface Topography (de Groot) 8:30 am to 12:30 pm, $405 / $465 / $261
Sun SC1164  Wavefront Data Analysis (Mahajan) 1:30 pm to 5:30 pm, $480 / $540 / $291

DETECTORS AND IMAGING
Sun SC1222  Deep Learning and Its Applications in Image Processing (Nasrabadi) 8:30 am to 5:30 pm, $665 / $770 / $383
Mon SC1274  Introduction to Fundamental Performance Limits of CCD and CMOS Imagers (Janesick) 1:30 pm to 5:30 pm, $545 / $605 / $317

OPTICAL DESIGN AND SYSTEMS ENGINEERING
Sun SC1271  Optical Measurement of Surface Topography (de Groot) 8:30 am to 12:30 pm, $405 / $465 / $261
Sun SC690  Optical System Design: Layout Principles and Practice (Greivenkamp) 8:30 am to 5:30 pm, $690 / $805 / $397
Sun SC1277  Photodetectors – A Practical Selection Guide (Piatek) 8:30 am to 12:30 pm, $405 / $465 / $261
Sun SC1121  Recent Developments in Laser Beam Engineering (Soskind) 8:30 am to 12:30 pm, $440 / $500 / $275
Sun SC1272  Mirror System Design with Freeform Surfaces (Sasián) 1:30 pm to 5:30 pm, $405 / $465 / $261
Mon SC254  Integrated Opto-Mechanical Analysis (Genberg, Doyle) 8:30 am to 5:30 pm, $725 / $840 / $411
Mon SC912  Intermediate Lens Design (Bentley) 8:30 am to 5:30 pm, $690 / $805 / $397
Mon SC915  Radiometry Revealed (Shaw) 8:30 am to 12:30 pm, $405 / $465 / $261
Mon SC700  Understanding Scratch and Dig Specifications (Aikens) 8:30 am to 12:30 pm, $405 / $465 / $261
Mon SC1017  Optics Surface Inspection Workshop (Aikens) 1:30 pm to 5:30 pm, $565 / $565 / $301
Tue SC1247  Polarized Light and Optical Design (Chipman, Young) 8:30 am to 5:30 pm, $655 / $770 / $383
Tue SC003  Practical Optical System Design (Youngworth, Olson) 8:30 am to 5:30 pm, $655 / $770 / $383
Tue SC1199  Stray Light Analysis and Control (Fest) 8:30 am to 5:30 pm, $700 / $815 / $401
Wed SC1165  Introduction to Applied Probability for Systems Engineers (Arenberg) 8:30 am to 12:30 pm, $405 / $465 / $261
Wed SC863  Introduction to Modern Optical Drawings – the ISO 10110 Standard (Aikens) 1:30 pm to 5:30 pm, $405 / $465 / $261

OPTICAL SYSTEMS AND LENS DESIGN
Mon SC912  Intermediate Lens Design (Bentley) 8:30 am to 5:30 pm, $690 / $805 / $397
Wed SC1086  Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroot Nelson) 8:30 am to 12:30 pm, $405 / $465 / $261

OPTICS + PHOTONICS FOR SUSTAINABLE ENERGY
Mon SC915  Radiometry Revealed (Shaw) 8:30 am to 12:30 pm, $405 / $465 / $261

OPTOMECHANICS AND OPTICAL MANUFACTURING
Sun SC213  Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $440 / $500 / $275
Sun-Mon SC014  Introduction to Optomechanical Design (Vukobratovich) 8:30 am to 5:30 pm, $1,180 / $1,445 / $653
Mon SC1169  Optical Manufacturing Fundamentals (Williamson) 8:30 am to 5:30 pm, $685 / $800 / $395
Tue SC015  Fastening Optical Elements with Adhesives (Daly) 8:30 am to 12:30 pm, $405 / $465 / $261
Tue SC010  Introduction to Optical Alignment Techniques (Castle) 8:30 am to 5:30 pm, $655 / $770 / $383
Tue SC1019  Mounting of Optical Components (Kasunic) 8:30 am to 5:30 pm, $735 / $850 / $415
Wed SC1086  Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroot Nelson) 8:30 am to 12:30 pm, $405 / $465 / $261
Thu SC1085  Optomechanical Systems Engineering (Kasunic) 8:30 am to 5:30 pm, $655 / $770 / $383

INDUSTRY AND EXHIBITORS
Mon SC1170  The Very Least You Need To Know About Optics (Diehl) 1:30 pm to 3:30 pm, $125 / $150 / $60

NANOSCIENCE
Sun SC1043  Shaping Light, with Applications in Advanced Microscopy and Optical Trapping (Dholakia, Spalding) 8:30 pm to 5:30 pm, $405 / $465 / $261

PRICE KEY: SPIE Member / Non-Member / Student Member
# Course Schedule

<table>
<thead>
<tr>
<th>Industry and Exhibitors</th>
<th>Detectors and Imaging</th>
<th>Advanced Metrology</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC1170 The Very Least You Need To Know About Optics (Diehl) 1:30 pm to 3:30 pm, $125 / $150 / $60</td>
<td>SC1222 Deep Learning and Its Applications in Image Processing (Nasrabadi) 8:30 am to 5:30 pm, $655 / $770 / $383</td>
<td>SC213 Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $440 / $500 / $275</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New SC1271 Optical Measurement of Surface Topography (de Groot) 8:30 am to 12:30 pm, $405 / $465 / $261</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SC1164 Wavefront Data Analysis (Mahajan) 1:30 pm to 5:30 pm, $480 / $540 / $291</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New SC1274 Introduction to Fundamental Performance Limits of CCD and CMOS Imagers (Janesick) 1:30 pm to 5:30 pm, $545 / $605 / $317</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SC1273 Introduction to Magnetic Random Access Memory (MRAM): Fundamentals, Current Status, and Emerging Device Concepts (Khalili) 8:30 am to 12:30 pm, $405 / $465 / $261</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SC1043 Shaping Light, with Applications in Advanced Microscopy and Optical Trapping (Dholakia, Spalding) 1:30 pm to 5:30 pm, $405 / $465 / $261</td>
</tr>
</tbody>
</table>

See course descriptions online or onsite. Register at the SPIE Cashier.
### Optical Design and Systems Engineering

<table>
<thead>
<tr>
<th>Day</th>
<th>Course Title</th>
<th>Time</th>
<th>Fees</th>
</tr>
</thead>
</table>
| Sunday    | Optical Measurement of Surface Topography (de Groot)                          | 8:30 am to 12:30 pm| $405 / $465/
|           |                                                                               |                    | $261       |
| Monday    | Integrated Opto-Mechanical Analysis (Genberg, Boyle)                          | 8:30 am to 5:30 pm | $725 / $840/|
|           |                                                                               |                    | $411       |
| Tuesday   | Polarized Light and Optical Design (Chipman, Young)                           | 8:30 am to 5:30 pm | $655 / $770/|
|           |                                                                               |                    | $383       |
| Wednesday | Introduction to Applied Probability for Systems Engineers (Arenberg)          | 8:30 am to 12:30 pm| $405 / $465/|
|           |                                                                               |                    | $261       |
| Thursday  | Optical System Design: Layout Principles and Practice (Greivenkamp)           | 8:30 am to 5:30 pm | $690 / $805/|
|           |                                                                               |                    | $397       |
| Monday    | Intermediate Lens Design (Bentley)                                           | 8:30 am to 5:30 pm | $690 / $805/|
|           |                                                                               |                    | $397       |
| Tuesday   | Practical Optical System Design (Youngworth, Olson)                           | 8:30 am to 5:30 pm | $655 / $770/|
|           |                                                                               |                    | $383       |
| Thursday  | Introduction to Modern Optical Drawings – the ISO 10110 Standard (Aikens)      | 1:30 pm to 5:30 pm | $405 / $465/|
|           |                                                                               |                    | $261       |
| Sunday    | Photodetectors – A Practical Selection Guide (Piatek)                         | 8:30 am to 12:30 pm| $405 / $465/|
|           |                                                                               |                    | $261       |
| Monday    | Recent Developments in Laser Beam Engineering (Soskind)                       | 8:30 am to 12:30 pm| $440 / $500/|
|           |                                                                               |                    | $275       |
| Tuesday   | Mirror System Design with Freeform Surfaces (Sasián)                          | 1:30 pm to 5:30 pm | $405 / $465/|
|           |                                                                               |                    | $261       |
| Thursday  | Radiometry Revealed (Shaw)                                                    | 8:30 am to 12:30 pm| $405 / $465/|
|           |                                                                               |                    | $261       |
| Wednesday | Stray Light Analysis and Control (Fest)                                       | 1:30 pm to 5:30 pm | $505 / $565/|
|           |                                                                               |                    | $301       |
| Thursday  | Understanding Scratch and Dig Specifications (Aikens)                        | 8:30 am to 12:30 pm| $405 / $465/|
|           |                                                                               |                    | $261       |
| Tuesday   | Optical System Inspection Workshop (Aikens)                                   | 1:30 pm to 5:30 pm | $505 / $565/|
|           |                                                                               |                    | $301       |
| Thursday  | Optics Surface Inspection Workshop (Aikens)                                   | 1:30 pm to 5:30 pm | $505 / $565/|
|           |                                                                               |                    | $301       |
| Monday    | Intermediate Lens Design (Bentley)                                           | 8:30 am to 5:30 pm | $690 / $805/|
|           |                                                                               |                    | $397       |
| Wednesday | Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroote Nelson) | 8:30 am to 12:30 pm| $405 / $465/|
|           |                                                                               |                    | $261       |

### Optical Systems and Lens Design

<table>
<thead>
<tr>
<th>Day</th>
<th>Course Title</th>
<th>Time</th>
<th>Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Intermediate Lens Design (Bentley)</td>
<td>8:30 am to 5:30 pm</td>
<td>$690 / $805/</td>
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<td>$397</td>
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</tbody>
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### Optics and Photonics for Sustainable Energy

<table>
<thead>
<tr>
<th>Day</th>
<th>Course Title</th>
<th>Time</th>
<th>Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>Radiometry Revealed (Shaw)</td>
<td>8:30 am to 12:30 pm</td>
<td>$405 / $465/</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>$261</td>
</tr>
</tbody>
</table>

See course descriptions online or onsite. Register at the SPIE Cashier.
## Optomechanics and Optical Manufacturing

<table>
<thead>
<tr>
<th>Time</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Optical Manufacturing Fundamentals</strong> (Williamson)**</td>
<td></td>
<td>$685 / $800 / $395</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Optical Materials, Fabrication and Testing for the Optical Engineer</strong> (DeGroote Nelson)**</td>
<td></td>
<td>$405 / $465 / $261</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Introduction to Interferometric Optical Testing</strong> (Wynn)**</td>
<td></td>
<td>$1,180 / $1,445 / $653</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 5:30 pm</td>
<td><strong>Optical Manufacturing Fundamentals</strong> (Williamson)**</td>
<td></td>
<td>$685 / $800 / $395</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 5:30 pm</td>
<td><strong>Optical Materials, Fabrication and Testing for the Optical Engineer</strong> (DeGroote Nelson)**</td>
<td></td>
<td>$405 / $465 / $261</td>
<td></td>
</tr>
</tbody>
</table>

## Remote Sensing

<table>
<thead>
<tr>
<th>Time</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm to 5:30 pm</td>
<td><strong>Radiometry Revealed</strong> (Shaw)**</td>
<td></td>
<td>$405 / $465 / $261</td>
<td></td>
</tr>
<tr>
<td>1:30 pm to 5:30 pm</td>
<td><strong>Introduction to LIDAR for Autonomous Vehicles</strong> (Shaw)**</td>
<td></td>
<td>$405 / $465 / $261</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Radiometry Revealed</strong> (Shaw)**</td>
<td></td>
<td>$405 / $465 / $261</td>
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</table>

## Signal, Image, and Data Processing

<table>
<thead>
<tr>
<th>Time</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 am to 12:00 pm</td>
<td><strong>MTF in Optical and Electro-Optical Systems</strong> (Boreman)**</td>
<td></td>
<td>$700 / $815 / $401</td>
<td></td>
</tr>
</tbody>
</table>

## X-Ray, Gamma-Ray, and Particle Technologies

<table>
<thead>
<tr>
<th>Time</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Photodetectors – A Practical Selection Guide</strong> (Piatek)**</td>
<td></td>
<td>$405 / $465 / $261</td>
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</tr>
</tbody>
</table>

## Workshops for Optics Educators

<table>
<thead>
<tr>
<th>Time</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am to 5:00 pm</td>
<td><strong>Student Chapter Leadership Workshop</strong> (Doumont)**</td>
<td></td>
<td>$50 / $50 / $50</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Duration</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Problem-Based Learning: Engaging Students in STEM</strong> (Donnelly)**</td>
<td></td>
<td>$15 / $20 / $15</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 12:30 pm</td>
<td><strong>Training the Trainer in OPTIKS: Outreach for Professionals Who Teach in Informal Environments and K-12 Schools</strong> (McKee, Magnani, Posner)**</td>
<td></td>
<td>$15 / $20 / $15</td>
<td></td>
</tr>
<tr>
<td>1:30 pm to 3:30 pm</td>
<td><strong>Dumpster Optics: Teaching Optics with Junk</strong> (Magnani, Viera-Gonzalez)**</td>
<td></td>
<td>$15 / $20 / $15</td>
<td></td>
</tr>
<tr>
<td>3:30 pm to 5:30 pm</td>
<td><strong>I SEE THE LIGHT! Demonstrations and Activities for Outreach Events</strong> (McKee)**</td>
<td></td>
<td>$15 / $20 / $15</td>
<td></td>
</tr>
</tbody>
</table>
The International Day of Light is a global initiative highlighting to the citizens of the world the importance of light and light-based technologies in their lives, for their futures, and for the development of Society.

SPIE supports the International Day of Light and its annual celebration on 16 May.

**SPIE IDL GRANTS**
SPIE provides seed funding up to US$3,000 to organizations creating Day of Light activities.

**IDL RESOURCES**
SPIE encourages communities to plan their own annual celebration on 16 May and provides various resources to help create an event.

**SPIE PHOTO CONTEST**
Amateur and professional photographers alike should submit photos demonstrating the vital role that light plays in our lives for a chance to win US$2,500.

Learn more: [spie.org/idl](http://spie.org/idl)
RELATED EVENTS

**Friends of Bill W.**  
**Day:** Tuesday 13 August 2019  
**Time:** 5:00 PM - 6:00 PM  
**Location:** Marriott Marquis, Laguna  
Join others for a self-organized Friends of Bill W. meeting at Optics + Photonics. Start off the week in a safe and supportive environment.

**Annual General Meeting of the SPIE Corporation**  
**Day:** Tuesday 13 August 2019  
**Time:** 6:00 PM - 7:00 PM  
**Location:** Marriott Marquis, Marina Ballroom E  
**Agenda:**  
- Report on the “State of the Society”  
- Treasurer’s Report  
- 2019 Election Results  
- Q&A with SPIE Officers  
This is the general business meeting of the Society. All SPIE Members are welcome and encouraged to attend. This is your forum for expressing your ideas about the Society. Results of the 2019 election will be announced, and there will be a report on the “State of the Society.” Questions are encouraged. This meeting will be followed by the Members Reception. Both events are open to Members only.

**Exhibition Ice Cream Social**  
**Day:** Thursday  
**Time:** 12:30 to 1:30 PM  
**Location:** Exhibition Hall  
Join representatives of companies in the exhibition and celebrate the end of the show with ice cream.

**Student Chapter Poster Exhibit**  
**Day:** Tuesday 13 August 2019  
**Time:** 10:00 AM - 5:00 PM  
**Location:** Conv. Ctr. Sails Pavilion, Exhibition Hall  
Discover how SPIE Student Chapters have helped increase optics awareness and literacy in their regions.

**Student Chapter Exhibit Mixer**  
**Day:** Tuesday 13 August 2019  
**Time:** 3:30 PM - 5:00 PM  
**Location:** Conv. Ctr. Sails Pavilion, Exhibition Hall  
Join us for refreshments and a late-afternoon mixer in the Student Chapter section of the Exhibition Hall. Meet our amazing students and learn about the innovative activities of some of the best and brightest Student Chapters across the globe!

**SPIE Career Lab Meetup**  
**Day:** Tuesday 13 August 2019  
**Time:** 4:30 PM - 5:30 PM  
**Location:** Conv. Ctr. Sails Pavilion, Exhibition Hall  
Join members of the SPIE Career Lab Editorial Board for a networking event focused on brainstorming and developing ideas for discussion topics and interaction on the SPIE Career Lab Facebook group.

**Job Fair**  
**Day:** Tuesday-Wednesday 13-14 August 2019  
**Time:** 10:00 AM - 5:00 PM  
**Location:** Conv. Ctr. Sails Pavilion, Exhibition Hall  
Top employers are coming together to interview and hire candidates. This is your chance to connect with the best, and meet recruiters on the exhibition floor.
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at table #902

AND

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JUST $25
PER YEAR

physicstoday.org/subscribe
GENERAL INFORMATION

Registration

Onsite Registration and Badge Pick-up Hours

CONFERENCE REGISTRATION
Marriott Marquis, Marina Foyer (Level 3)
Saturday, 10 August · 10:00 AM - 5:00 PM

CONFERENCE + EXHIBITION REGISTRATION
San Diego Convention Center, Sails Pavilion (Upper Level)
Sunday, 11 August · 7:15 AM - 5:00 PM
Monday, 12 August · 7:30 AM - 5:00 PM
Tuesday, 13 August · 7:30 AM - 5:00 PM
Wednesday, 14 August · 7:30 AM - 5:00 PM
Thursday, 15 August · 7:45 AM - 4:00 PM

CONFERENCE REGISTRATION INCLUDES:
• Admission to all conference sessions, plenaries, panels, and poster sessions
• Admission to the Exhibition
• All-Conference Welcome Reception
• Coffee breaks
• A choice of online proceedings via the SPIE Digital Library

COURSE AND WORKSHOP REGISTRATION
• Courses and workshops are priced separately.
• Course-only registration includes your selected course(s), course notes, coffee breaks, and admittance to the exhibition.
• Course prices include applicable taxes.
• Onsite, please go to Course Materials Pickup after you pick up your badge at main registration.
• Multiple facilities may be used for courses; allow yourself enough time to register, pick up your materials, and possibly walk to a nearby facility before your course begins.

EXHIBITION REGISTRATION
• Exhibition-Only visitor registration is complimentary.
• The Exhibition is open Tuesday, Wednesday, and Thursday

PRESS REGISTRATION
• For credentialed press and media representatives only.
• See our press registration page for SPIE policy.
• Please email contact information, title and organization to media@spie.org

Onsite Services

Internet Access
Lobbies and Meeting Rooms
Complimentary wireless internet access provided in meeting rooms and lobbies on the conference room level. Instructions will be posted onsite.

SPIE Conference and Exhibition App
Search and browse the program, special events, participants, exhibitors, courses, and more. Free Conference App available for iPhone and Android phones.

SPIE Bookstore
Conv. Ctr. Sail Pavilion (Upper Level)
Stop by the SPIE Bookstore to browse the latest SPIE Press Books, proceedings, and educational materials. While there, get a t-shirt or educational toy to bring home to the family.

SPIE Education Services
Conv. Ctr. Sail Pavilion (Upper Level)
Browse course offerings or learn more about SPIE courses available in portable formats such as online and customized, In-company courses.

SPIE Luggage and Coat Check
Convention Center, Hall A Lobby (Ground Level)
Sunday through Wednesday · 7:30 AM - 6:00 PM
Thursday · 8:00 AM - 6:00 PM
Complimentary luggage, package, and coat storage are available. Please note hours; no late pickup available.

Business Center
FedEx Kinko, Convention Center, Hall D Lobby (Ground Level)
Monday through Thursday · 8:00 AM - 6:00 PM
Services include photocopying, faxing, printing services, and shipping. Office supplies are also available. Phone +1 619 525 5450

Restaurant and City Information
Conv. Ctr. Hall B Lobby (Ground Level)
Sunday through Thursday · 9:00 AM - 6:00 PM
Services include sightseeing, shopping, and restaurant information

Child Care Services
Marion’s Childcare, Inc.
Email: amy@hotelchildcare.com
Office: +1 619 303 4379 or text +1 619 663 4379
Note: SPIE does not imply an endorsement nor recommendation of these services. They are provided on an “information only” basis for your further analysis and decision. Other services may be available.

Lobby Services and Amenities

ATMs
Convention Center, Hall B Lobby & Hall E Lobby (Ground Level)

Courtesy Phones
Convention Center Lobbies
Free local calls.

Nursing Mother’s Lounge
Convention Center, Hall A Lobby & Hall E Lobby (Ground Level)
The lounges are located inside the women’s restroom. Each lounge is equipped with comfortable furniture and a separate private area for nursing mothers. Power outlets are available. There is no storage or refrigeration available in the Nursing Mother’s Lounge.

Gender Inclusive Restroom
Convention Center, Hall A Lobby (Ground Level)
He’s got it. Shouldn’t you?

Sign up to the free weekly newsletter and we’ll send the news to you.

optics.org/newsletter

Get the latest industry news.

optics.org

Celebrating 23 years of online excellence.
**Quiet Room**
Conv. Ctr., Sails Pavilion (Upper Level) Registration Area. Open during registration hours.
The Quiet Room is intended for silent meditation, reflection or prayer. No mobile device or computer use, and no food or beverages allowed.

**Urgent Message Line**
An urgent message line is available during registration hours, 619-525-5407.

**Lost and Found**
Cashier, Conv. Ctr. Sail Pavilion (Upper Level)
Open during registration Hours
Found items will be kept at Cashier the duration of the meeting. At the end of the meeting, all found items will be turned over to the San Diego Convention Center Security, lost and found hotline: +1 619 525 5407.

**Food and Beverage Services**
**Complimentary Coffee**
- **Sunday**: 7:30 AM - 4:00 PM
  Room 6A Lobby, Conv. Ctr. (Upper Level)
- **Monday**: 7:30 AM - 4:00 PM
  Room 6A Lobby, Conv. Ctr. (Upper Level)
- **Tuesday**: 7:30 AM - 9:30 AM
  Room 6A Lobby, Conv. Ctr. (Upper Level)
  10:00 AM - 4:00 PM
  Exhibition Hall, Conv. Ctr. Sail Pavilion (Upper Level)
- **Wednesday**: 7:30 AM - 9:30 AM
  Room 6A Lobby, Conv. Ctr. (Upper Level)
  10:00 AM - 4:00 PM
  Exhibition Hall, Conv. Ctr. Sail Pavilion (Upper Level)
- **Thursday**: 7:30 AM - 9:30 AM
  Room 6A Lobby, Conv. Ctr. (Upper Level)
  10:00 AM - 2:00 PM
  Exhibition Hall, Conv. Ctr. Sail Pavilion (Upper Level)
  2:00 PM - 4:00 PM
  Room 6A Lobby, Conv. Ctr. (Upper Level)

**Food and Refreshments for Purchase**
**STARBUCKS**
Conv. Ctr. Lobby B (Ground Level)
Sunday and Monday: 7:00 AM - 3:00 PM
Tuesday and Wednesday: 7:00 AM - 4:00 PM
Thursday: 7:00 AM - 2:00 PM

**MRS. FIELDS COOKIES / AUNTIE ANNE’S PRETZELS**
Conv. Ctr. Upper Lobby 6A (Upper Level)
Sunday through Thursday: 7:30 AM - 4:00 PM

**Travel**

**Welcome to San Diego**
With 70 miles of beautiful beaches, near-perfect weather year-round, and a variety of magnificent settings countywide, San Diego offers a fun and inexpensive getaway, for kids and adults, any time of year. No stay in San Diego is complete without a trip to the waterfront. San Diego Bay is bustling with activity, as it serves as the homeport for Navy ships, a large sport fishing fleet, thousands of pleasure craft, and the USS Midway Museum is a retired aircraft carrier that now serves as a fascinating interactive floating museum. The largest urban cultural park in the United States, Balboa Park is often referred to as the “Smithsonian of the West.” Its 1,200 lush acres are home to 55 cultural attractions, including 15 museums, eight gardens and the San Diego Zoo.

**Airport Information**
San Diego International Airport (SAN) is conveniently located three miles northwest of downtown San Diego.

**Transportation from the Airport**
Taxi service from the San Diego Airport to the downtown hotels is approximately US $15-25 depending on traffic. Uber or Lyft from the San Diego Airport to the downtown hotels is approximately US $6-8 (shared ride) or US $12-17.

**SHUTTLES AND PUBLIC TRANSPORTATION**

**Bayfront Shuttle**
US $3 to ride all day - hop on the Big Bay Shuttle to visit the numerous hotels, attractions, shops and restaurants along the scenic San Diego bay. Shuttle route includes Hilton Bayfront, Marriott Marquis & Marina, Seaport Village, Broadway/Navy Pier, Maritime Museum, Sheraton Hotel & Marina.

**San Diego Trolley - Metropolitan Transit System**
Trolley cars are red and travel above ground on light rail lines every 15 minutes. If guests purchase Day Tripper Passes from the Transit e-store (on-line), before their arrival date, they can then use Bus 992 from the airport to the America Plaza Trolley Station to your hotel and to and from the convention center for unlimited rides at that one flat rate. Or you can purchase a day pass for $5 (subject to change) when you board the 992 bus at the airport from any Terminal. Get off at Broadway and Kettner Blvd. and walk to the America Plaza Trolley Station. From there, take the Orange Line with signage ‘Downtown/Convention Center’ to your hotel or to the convention center.

**Driving Directions and Parking**
Find links to the PDFs of Driving Directions to the San Diego Convention Center and Hotels, the San Diego Convention Center Parking, and rates, and for Parking in the vicinity of the San Diego Convention Center online, on the SPIE Optics + Photonics travel information page.
Use Parking Panda to reserve parking at the lots and garages surrounding the San Diego Convention Center.

**Car Rental**
Hertz Car Rental is the selected as the official car rental agency for this Event. To reserve a car, identify yourself as an Optics + Photonics conference attendee using the Hertz Meeting Code CV#029BO024. Discount rates apply for rentals up to one week prior through one week after the conference dates. Note: When booking from International Hertz locations, the CV # must be quoted with the letters CV before the number, i.e. CV029BO024. Click here to book online Book Hertz Online. Be sure to enter the code to receive the meeting discount rate.

- In the United States call +1 800 654 2240.
- In Canada call 1-800-263-0600, or +1 416 620 9620 in Toronto.
- In Europe and Asia call the nearest Hertz Reservation Center or travel agent.
- Outside of these areas call +1 405 749 4434.
SPIE Event Policies

Acceptance of Policies and Registration Conditions

The following Policies and Conditions apply to all SPIE Events. As a condition of registration, you will be required to acknowledge and accept the SPIE Registration Policies and Conditions contained herein.

Attendee Registration and Admission Policy
SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry or to remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, whose conduct is not in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to anyone who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

Payment Policy
Registrations must be fully paid before access to the conference is allowed. SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks and wire transfers. Onsite registrations can also be paid with cash.

SPIE Safe Meeting Policy | Code of Conduct
SPIE is committed to providing a harassment- and discrimination-free experience for everyone at our events, an experience that embraces the richness of diversity where participants may exchange ideas, learn, network, and socialize in the company of colleagues in an environment of mutual respect.

SPIE does not tolerate harassment of event participants, attendees, exhibitors, speakers, volunteers, contractors, service providers, venue staff, or SPIE staff. This Code of Conduct applies to all SPIE meeting-related events, including those sponsored by other organizations but held in conjunction with SPIE events, in public or private facilities.

The SPIE Anti-Harassment Policy may be found at spie.org/policy (PDF)
The SPIE Code of Conduct may be found at spie.org/conduct (PDF)

In addition, SPIE Members and authors of SPIE publications must adhere to the SPIE Code of Ethics, found at spie.org/ethics (PDF)

Reporting of Unethical or Inappropriate Behavior
Onsite at an SPIE meeting, contact any SPIE Staff with concerns or questions for thorough follow-up. If you feel in immediate danger, please dial the local emergency number for police intervention.

SPIE has established a confidential reporting system for staff and all meetings participants to raise concerns about possible unethical or inappropriate behavior within our community. Complaints may be filed by phoning toll-free to +1-888-818-6898 from within the United States and Canada, or online at www.SPIE.ethicspoint.com and may be made anonymously.

Identification Requirement Policy
To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued photo identification at registration to collect registration materials.

Individuals are not allowed to pick up badges for other attendees. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

Access to Conference Events / Access for Children Younger than 18
All conference technical and networking events require a badge for admission. Registered attendees may bring children with them as long as they have been issued a badge. Registration badges for children under 18 are free and available at the SPIE registration desk onsite. Children under 14 years of age must be accompanied by an adult at all times, and guardians are asked to help maintain a professional, disturbance-free conference environment.

Exhibition Hall Access / Access for Children Younger than 18
Everyone who attends the exhibition must be registered and have a badge. Badges for children are free and available onsite at the registration desk. Children under 14 years of age must be accompanied by an adult at all times. Guardians are asked to help maintain a professional, disturbance-free exhibition environment. Children under 18 are not allowed in the exhibition area during exhibition move-in and move-out.
Unauthorized Solicitation Policy
Unauthorized solicitation in the Exhibition Hall is prohibited. Any nonexhibiting manufacturer or supplier observed to be distributing information or soliciting business in the aisles, or in another company’s booth, will be asked to leave immediately.

Recording Policy
Conferences, courses, and poster sessions: For copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter or instructor. Attendees may not capture or use materials presented in any meeting/course room or in course notes on display without written permission. Consent forms are available at Speaker Check-In or SPIE Registration. Individuals not complying with this policy will be asked to leave a given session and/or asked to surrender their recording media. Refusal to comply with such requests is grounds for expulsion from the event.

Exhibition Hall: Recordings of any kind are prohibited without explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their recording media and to leave the exhibition hall. Refusal to comply with such requests is grounds for expulsion from the event.

Capture and Use of a Person’s Image
By registering for an SPIE event, you grant full permission to SPIE to capture, store, use, and/or reproduce your image or likeness by any audio and/or visual recording technique and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE marketing or promotional purpose.

By registering for an SPIE event, you waive any right to inspect or approve the use of the images or recordings or of any written copy. You also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, you release, defend, indemnify and hold harmless SPIE from and against any claims, damages or liability arising from or related to the use of the images, recordings or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion or use in composite form that may occur or be produced in taking, processing, reduction or production of the finished product, its publication or distribution.

Laser Pointer Safety Information/Policy
SPIE supplies tested and safety-approved laser pointers for all conference meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers.
Use of a personal laser pointer represents the user’s acceptance of liability for use of a non-SPIE-supplied laser pointer. If you choose to use your own laser pointer, it must be tested to ensure <5 mW power output. Laser pointers in Class II and IIIa (<5 mW) are eye safe if power output is correct, but output must be verified because manufacturer labeling may not match actual output. You are required to sign a waiver releasing SPIE of any liability for use of potentially non-safe, personal laser pointers. Waivers are available at Speaker Check-In.

Unsecured Items Policy
Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

Wireless Internet Service Policy
At most events, SPIE provides wireless access for attendees. Properly secure your computer before accessing the public wireless network. SPIE is not responsible for computer viruses or other computer damage.

No-Smoking Policy
Smoking, including e-cigarettes, is not permitted at any SPIE event.

Agreement to Hold Harmless
Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Event Cancellation Policy
If for some unforeseen reason SPIE should have to cancel an event, processed registration fees will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.

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PO Box 10
Bellingham, WA 98227-0010 USA
Tel: +1 360 676 3290
Fax: +1 360 647 1445
help@spie.org • www.SPIE.org

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Ffordd Pengam, Cardiff, CF24 2SA UK
Tel: +44 29 2089 4747
Fax: +44 29 2089 4750
info@spieeurope.org • www.SPIE.org
SPIE CORPORATE MEMBERSHIP

SPIE Corporate Membership gives companies the best visibility in the industry, access to important information (the latest R&D updates, educational opportunities, and industry intelligence) and top talent.

SPIE, with more Corporate Members than any society or association in our field, is the definitive global business resource for the photonics industry and its members.

That’s why SPIE is recognized as “best for industry”—and why joining is good for business.
Mark your Calendar

Optics + Photonics 2020

Participate in the premier event for optical engineering and applications, nanotechnology, quantum science, and organic photonics.

23–27 August 2020 · San Diego, California, USA
OPTICS & PHOTONICS International Exhibition

OPIE ’20

LASER EXPO
- Power Laser Forum zone
- Laser Lighting - Display, Optical Wireless Power Transmission zone
- Optical Fiber zone

LENSES EXPO

IR + UV EXPO

Industrial Camera & Advanced Imaging EXPO

Space & Astronomical Optics EXPO

Positioning EXPO

Co-located with Congress OPIC2020
http://www.opicon.jp/

22-24 April, 2020
Pacifico Yokohama, Japan

Total Projected Participation
- Exhibitors 400
- Attendees 20,000

International Partner
SPIE.
PHOTONICS MEDIA

For further information
OPTRONICS www.opie.jp/en/