SPIE OPTICS + PHOTONICS
EXHIBITION GUIDE

Exhibition: 8–10 August 2017
Conferences and Courses: 6–10 August 2017
San Diego Convention Center • San Diego, California, USA
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SPIE is the international society for optics and photonics, a not-for-profit organization founded in 1955 to advance light-based technologies. The Society serves nearly 264,000 constituents from approximately 166 countries, offering conferences, continuing education, books, journals, and a digital library in support of interdisciplinary information exchange, professional growth, and patent precedent. SPIE provided over $4 million in support of education and outreach programs in 2016.
The Lasers & Photonics Marketplace Seminar is the only one-day event that covers the full spectrum of photonics markets from industrial to scientific to biophotonics. Geared to executive management professionals seeking candid marketplace insights from business leaders who discuss openly, the tough and controversial topics that challenge our field. Delegate benefits include:

- First look at the 2018 Worldwide Laser Markets Report, as presented by analyst Allen Nogee
- Exclusive insights from industry leaders
- Deeper knowledge of business and technology trends
- Peer to peer networking opportunities with executives from global laser and photonics companies
- Identify and connect with emerging and startup companies
- $1,000 discount on the full Worldwide Laser Market Report
- Continental breakfast, catered lunch, coffee breaks, and evening cocktail reception

Promotional Partners
AT-Fachverlag GmbH
Electro Optics Magazine
Laser Focus World
Novus Light Technologies Today optics.org
Photonics Spectra, A Photonics Media Publication
Photonics Online
Physics Today
Spectroscopy Magazine
The Optronics Co., Ltd.
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See the whole SPECTRUM of Photonik

Check out our website: www.photonik.de
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FEATURED PRODUCTS

4D Technology
Booth #365

Andover Corporation
Booth #650

Edmund Optics Inc.
Booth #445
10 x 266nm Fixed DA Beam Expander with divergence adjustment

AdlOptica Optical Systems GmbH
Booth #837

Hard-Coated optical bandpass filters offering unsurpassed performance and durability

Applied NanoTools
Booth #839

Fresnel Technologies, Inc.
Booth #431

0.250um Aspheres

Aerotech, Inc.
Booth #649

Multi-focus optics for multi-kW lasers

Ibsen Photonics
Booth #106

DI5B, Ibsen’s new OEM spectrometer electronics with SPI, well-suited for LIBS.

Agilent Technologies, Inc.
Booth #434

Characterize optical components, thin films and advanced materials in minutes.

II-VI Optical Systems
Booth #838

Automatic Research GmbH
Booth #632

Altitude Compensated Lens - Visible (Athermal)

TFC200, Compact Slot die printing tool for research & development

AccuFiz SIS Fizeau Interferometer for measuring transparent, plane-parallel optics

15 nm X-Ray Optics + Silicon Photonic Metallization

HEx300-230HL hexapod for applications from sensor testing to synchrotrons

S100I/HR one of the State-of-the-Art S-Series Interferometers including 50, 100 & 150 mm apertures
KOHZU Precision Co., Ltd. c/o Daniel F Crews LLC  
Booth #728  
Semiconductor Laser Measurement System

Lake Shore Cryotronics  
Booth #460  
New cryogenic probe station option for THz-frequency on-wafer contact probing

LightTrans International UG  
Booth #760  
VirtualLab Fusion Software for Fast Physical Optics

Mad City Labs, Inc.  
Booth #359  
Cage mount piezo closed loop nanopositioners for beam-steering with nanoradian resolution

Mahr  
Booth #435  
Truly vibration-insensitive measurement of optical, machined, and semiconductor wafer surfaces

Moxtek, Inc.  
Booth #465  
Moxtek’s Ice Cube enables engineers to design smaller optical systems

Micro Laser Systems, Inc.  
Booth #361  
100mm Fiber Collimator at 1550nm is designed for Free Space Communications.

Micro-LAM Inc.  
Booth #644  
Optimus T+1, Laser Assisted Machining Device

Minus K Technology, Inc.  
Booth #439  
RXY3 frictionless tip/tilt piezo stage for fast-beam steering

Newport Thin Film Laboratory, Inc.  
Booth #560  
NTFL offers vacuum-deposited UltraShield, which is highly oleophobic and hydrophobic.

Nikon Corporation  
Booth #834  
Nikon optical material will be available in major optical design software in this year.

Ocean Optics, Inc.  
Booth #339  
Ocean FX spectrometer offers fast acquisition speed and spectral buffering.
FEATURED PRODUCTS

OptiPro Systems
Booth #1004

PRO 160 Series: High performance machines for spheres & aspheres up to Ø 160mm.

OptoSigma
Booth #755

Cage System 12.7mm and 25.4mm Variety of Optic Holders

PerkinElmer, Inc.
Booth #564

LAMBDA™ 1050 - Greater level of sensitivity, resolution and speed in the NIR range.

PHASICS Corp.
Booth #765

Off axis MTF and wavefront error at multiple wavelengths on a same automated bench

piezosystem jena GmbH
Booth #556

Digital Piezo Controller: d-Drive Pro 24bit resolution, 3 channel amp with 120 mA continuous current

PG&O—Precision Glass & Optics
Booth #363

PG&O provides precision optical manufacturing for complex, commercial/military/avionics applications.

Schott North America
Booth #754

1,200 mm polished ultra-lightweight ZERODUR® mirror - lightweight factor 88%.

Sutter Instrument
Booth #548

The Sutter BOB is a configurable open-design upright microscope platform.

Thermo Scientific - CIDTEC
Booth #457

KiloRAD PTZ, Radiation tolerant camera with integrated Pan/Tilt/Zoom function.

Trioptics, Inc.
Booth #639

OptiCentric® Dual

Advanced Centration Measurement of Lenses and Complex Optical Systems

Universal Photonics
Booth #661

SOMOS TPM. Internally-cooled, temperature-controlled, double-sided polishing and lapping.

Vincent Associates
Booth #532

Introducing the all-new Auto Iris with a variable aperture range of 1.5mm - 25mm. Coming soon

Zurich Instruments AG
Booth #744

Ultra high frequency digital lock-in amplifier with boxcar average
EXHIBITOR DIRECTORY

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 45–47, 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.

EXHIBITION HOURS
Tuesday 8 August · 10:00 am to 5:00 pm
Wednesday 9 August · 10:00 am to 5:00 pm
Thursday 10 August · 10:00 am to 2:00 pm
San Diego Convention Center, Exhibition Hall A
San Diego, California, USA

4D Technology Corp. #365
SPIE Corporate Member
3280 E Hemisphere Loop Ste 146, Tucson, AZ, 85706-5024 USA
+1 520 294 5600; fax +1 520 294 5601
info@4dtechnology.com; www.4dtechnology.com

Featured Product: PhaseCam dynamic Twyman-Green laser interferometers: measure optical quality despite vibration
4D Technology designs and manufactures dynamic laser interferometers, optical profilers, surface gauges and polarization cameras for non-contact metrology of precision surfaces, even in the presence of vibration. 4D interferometers acquire data in as little as 30 microseconds, at wavelengths from DUV through IR. Applications include astronomy, aerospace, general optics, flexible electronics, displays and more. Contact: Jack Latchinian, West Coast Region Manager, jack.latchinian@4dtechnology.com; Stephen J. Martinek, Director of Worldwide Sales, steve.martinek@4dtechnology.com

AccuCoat Inc. #543
111 Humboldt St Ste 8, Rochester, NY, 14609 USA
+1 585 288 2330; fax +1 585 288 2331
office@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 variety of antireflective, beamsplitter, hot and 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 60 years combined engineering experience can provide custom designed solutions. Contact: Alan Parsons, Sales Engineer, alan@accucoatinc.com
EXHIBITOR DIRECTORY

Accumold
1711 SE Oralabor Rd, Ankeny, IA, 50021 USA
+1 515 964 5741
micromolding@accu-mold.com; www.accu-mold.com

Featured Product: Micro Molding Services: Micro Optics, Medical or Micro Electronic Applications.
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@accu-mold.com; Rick Brown, Optics Sales Engineer, rbrown@accu-mold.com

ADIT Electron Tubes
300 Crane St, Sweetwater, TX, 79556-0870 USA
+1 325 235 1418; fax +1 325 235 2872
sales@electrontubes.com; www.electrontubes.com

Featured Product: New series of 2” and 3” compact photomultiplier tubes. New 1” and 2” high QE photomultiplier tubes.
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
AdlOptica Optical Systems GmbH  #837
Rudower Chaussee 29, Berlin, 12489 Germany
+49 30 6590 8880; fax +49 30 6590 8881
info@adloptica.com; www.adloptica.com

**Featured Product: foXXus - multi-focus optics for multi-kW lasers**
AdlOptica works in field of Laser Beam Shaping Optics transforming Gaussian to flattop beams and finding numerous industrial and scientific applications. Multi-year developments are realized in family of pShaper systems, > 50 models: almost 100% efficiency, spectrum from UV to IR, power from mW to kW, CW or pulse lasers, achromatic design, variety of flattop spot sizes, low sensitivity to misalignment. AdlOptica is located in Adlershof, Berlin, Germany’s leading science and technology park.

Contact: Alexander Laskin, Project Manager, alex@adloptica.com; Vadim Laskin, General Manager, vadimus@adloptica.com

Andover Corp.  #650
4 Commercial Dr, Salem, NH, 03079-2800 USA
+1 603 893 6888; fax +1 603 893 6508
info@andovercorp.com; www.andovercorp.com

**Featured Product: Custom Infrared Optical Coatings**
Andover Corporation is a recognized world leader in the manufacture of high-quality optical coatings and optical filters. We manufacture a broad array of standard and custom components including bandpass, ND, long- and short-pass, heat-control filters, and more. Wavelengths from UV to Mid IR. Optical coating deposition techniques include ion-assisted e-beam deposition (IAD), and magnetron sputtering. Contact: Sue Brennan, Inside Sales Representative, sue.brennan@andovercorp.com; Phil Clark, Technical Sales Representative, pclark@andovercorp.com

Aerotech, Inc.  #649
101 Zeta Dr, Pittsburgh, PA, 15238-2811 USA
+1 412 963 7470; fax +1 412 963 7459
sales@aerotech.com; www.aerotech.com

Aerotech manufactures motion control and positioning systems and components including direct-drive and piezo nanopositioners; hexapods; gimbals/optical mounts; planar and rotary air-bearing stages; high-speed gantries; mechanical-bearing linear, rotary, and lift stages; brushless linear and rotary servomotors and drives; stand-alone and software-based motion controllers; goniometers; and galvanometers. Custom, vacuum prepped, and cleanroom-ready positioning systems and components are available. Contact: Michael Basile, Sr. Sales and Application Engineer, mbasile@aerotech.com

Agilent Technologies, Inc.  #434
2850 Centerville Rd, Wilmington, DE, 19808-1610 USA
+1 800 227 9770
inquiries@agilent.com; www.agilent.com

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.

Applied NanoTools  #839
X-Ray and Silicon Photonic Optics, 11421 Saskatchewan Dr NW, Edmonton, AB, T6G 2M9 Canada
+1 780 628 5830; fax +1 780 628 5830
info@appliednt.com; www.appliednt.com

**Featured Product: X-Ray/EUV Optics and gratings and silicon photonics**
Applied Nanotools (X-Ray Optics division) is a leading supplier of Fresnel zone plates, transmission gratings and calibration standards for X-Ray and EUV applications. Applied Nanotools (Silicon Photonics division) is a fast turn-around silicon photonics fabrication service for cutting-edge silicon photonics applications. Contact: Rob Peters, Project Manager (X-Ray Optics), robpeters@appliednt.com; Cameron Horvath, Project Manager (Silicon Photonics), cameron@appliednt.com

Applied Surface Technologies  #766
15 Hawthorne Dr, New Providence, NJ, 07974 USA
+1 908 464 6675
c02clean@co2clean.com; www.co2clean.com

**Featured Product: CO2 Snow Cleaning**
We show precision cleaning solutions using CO2 Snow - a safe and nondestructive process for particle removal from visible down to 0.005 microns and hydrocarbon residues. We will demonstrate manual, portable, and semi automated units, for cleaning application in research, development, and manufacturing. The CO2 Snow Cleaning process cleans metals, ceramics, optics, substrates, vacuum parts, fiber optics, diamond turned optics, disk drives, sensors, analytical samples, telescope mirrors and more. Contact: Robert Sherman, President, RobertS@co2clean.com

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### Apre Instruments

**SPIE 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:** S100|HR Interferometer: 100um resolution, <0.1% distortion imaging & almost no re-trace error

APR interferometers improve your optical manufacturing, alignment and testing process controls for surface and wavefront measurements. Scale up your manufacturing capabilities with state-of-the-art interferometers that allow you to see more. We can also upgrade your present interferometers to their theoretical peak at 1/3 the price of a comparable performance new system. www.apre-inst.com. Contact: Donald Pearson II, Vice President Sales, dpearson@apre-inst.com; Robert Smythe, President, rsmythe@apre-inst.com

### attocube systems Inc.

**SPIE Corporate Member**

2020 Stuart St, Berkeley, CA, 94703 USA

+1 510 649 9245

info@attocube.com; www.attocube.com

attocube is a well-established premium-quality manufacturer for high precision piezo positioning devices, optical displacement sensors and cryogenic measurement systems. The attoDRY800 is the world’s first cryo-optical table and the perfect choice for low temperature quantum optics experiments. attocube’s renowned piezo stages enable nanometer precise positioning even under extreme environmental conditions such as cryogenic temperatures, high magnetic fields and high or ultra-high vacuum.

### Automatic Research GmbH

**SPIE Corporate Member**

c/o ZAE Bayern, Immerwahrstr 2, Erlangen, 91058 Germany

+49 9131 6055 684

info@automatic-research.de; www.automatic-research.de

**Featured Product:** TFC200, Compact Slot die printing tool for research & development

Automatic Research is an innovative manufacturer for highest quality, turnkey and easy-to-use equipment and printing systems for research in printed electronics and other functional films. We provide a series of solutions for optical and electrical characterization of printed semiconductors and the deposition of functional films with Slot die coating. Moreover, we supply laser patterned glass as well as flexible substrates with custom layout (ITO-Glass, IMI-PET, etc.). Contact: Tobias Stubhan, CEO, ts@automatic-research.de

### Breault Research Organization Inc.

**SPIE Corporate Member**

4400 E Broadway Blvd Ste 500, Tucson, AZ, 85711-3554 USA

+1 800 882 5085; fax +1 520 721 9630

sales@breault.com; www.breault.com

**Featured Product:** Contour GT-K

Breuker is a leader in metrology solutions that provide high-fidelity imaging and trusted measurements for fundamental and advanced surface characterization. Incorporating decades of our Wyko profiler innovations, Breuker’s latest 3D optical microscopes measure surface texture, corrosion, wear, volume loss, and many other s-parameters. Contact: Ian Armstrong, Sales Apps Manager, ian.armstrong@bruker.com; Steve Ziegler, Sales Account Manager, steve.ziegler@bruker.com

### Canon USA

**SPIE Corporate Member**

One Canon Park, Melville, NY, 11747 USA

+1 516 330 5000

pr@cusa.canon.com; www.canonusa.com

**Featured Product:** Point illuminated spectroscopy

Canon’s Point illuminated spectroscopy solutions are designed to improve your research. With a wide range of imaging and measurement options, we offer extreme flexibility in our spectroscopy systems, enabling you to tailor your system to your exact needs.

### Chroma Technology

**SPIE Corporate Member**

10 Intec Ln, Bellows Falls, VT, 05346 USA

+1 802 428 2500

sales@chroma.com; www.chroma.com

Precision optical filters and coatings designed/manufactured for a broad range of applications including fluorescence microscopy, forensics, material analysis, laser-based imaging, astronomy, absorption spectroscopy. Bandpass and edge filters, laser rejection filters, neutral density filters, polychroic beamsplitters and custom coatings for UV, visible and near-IR portions of the spectrum. Multiple coating methods offer flexibility in designs and turnaround for prototyping. sales@chroma.com. Contact: Christopher Conca, OEM Sales Engineer, cconca@chroma.com; Kelly Stockwell, OEM Sales Engineer, kstockwell@chroma.com

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#72 5

#8 61
**CoorsTek, Inc.**
14143 Denver West Pkwy, Suite 400, Golden, CO, 80401 USA
+1 303 271 7100; fax +1 844 208 7970
info@coorstek.com; www.coorstek.com

**Featured Product: Ceramic Mirrors, Optics & Structures for Aerospace Sensing & Imaging**
CoorsTek silicon carbides (SiC) are engineered and optimized specifically for optics and imaging applications which demand high stiffness, low mass, and thermal stability. Our silicon carbides are ideally suited for mirrors, focal plane array components, and structural supports used in aerospace and specialized ground-based optical systems. Silicon carbide optical systems are engineered for low mass, low complexity, athermal designs — enhancing optical system performance and reliability.

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**Cornell Technical Services, LLC**
22 Enterprise Pkwy Ste 150, Hampton, VA, 23666-6414 USA
+1 757 320 0216; fax +1 757 315 8829
easss@cts-llc.com; www.cts-llc.com/index.asp

**Featured Product: Seeking Experienced Flight Qualified Instrumentation Experts to support NASA’s SMD Proposal Reviews**
Cornell Technical Services, LLC (CTS) provides support for proposal evaluations, assessments, and studies of programs and missions for NASA's Science Office for Mission Assessments (SOMA) at the NASA Langley Research Center in Hampton, Virginia. The program provides support to NASA's Science Mission Directorate in evaluating new and innovative approaches for missions intended to help answer the big questions in Earth and Space science. Qualified candidates can be remote. Contact: Fabiola Mariscal, Recruiter, fmarsical@cts-llc.com; Gregory Manuel, Project Manager, gmanuel@cts-llc.com

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**DataRay Inc.**
1675 Market St, Redding, CA, 96001 USA
+1 530 776 0843 x1004; fax +1 530 255 9062
sales@dataray.com; www.dataray.com

**Featured Product: WinCamD-IR-BB: 2-16 μm beam profiler**
DataRay Inc. was founded in 1988 to bring high-quality, affordable, and reliable instrumentation to the photonics industry: No-risk evaluation: 30-day evaluation PO option; Wide bandwidth: product portfolio covers wavelengths from deep UV to FIR; No hidden costs of ownership: standard 3-year warranty; ISO 11146 compliant beam profiling; Free, user-friendly software with free downloadable updates, no license limits. Contact: John Wilson, VP Sales, jwilson@dataray.com

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+1 909 593 9330
info@diverseoptics.com; www.diverseoptics.com

Featured Product: Your Polymer Optics Perfected.
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 Treviño, Sales Engineer, info@diverseoptics.com

Dynamic Structures - Optics #761
1515 Kingsway Ave, Port Coquitlam, BC, V3C 1S2 Canada
+1 604 639 8200; fax +1 604 294 4550
empireds.com

Edmund Optics Inc. #445
101 E Gloucester Pike, Barrington, NJ, 08007-1380 USA
+1 856 547 3488; fax +1 856 573 6295
sales@edmundoptics.com; www.edmundoptics.com

Featured Product: 10X 266nm Fixed DA Beam Expander with divergence adjustment
Edmund Optics, celebrating 75 years, 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 & pursues new ways to implement optical technology, enabling advancements in industrial metrology, semiconductor manufacturing, life sciences, and more. Contact: Natalie Lyons, Trade Show Manager, nlyons@edmundoptics.com; Michael Deal, Assistant Marketing Manager, mdeal@edmundoptics.com

EMF Corp. #629
239 Cherry St, Ithaca, NY, 14850-5024 USA
+1 800 456 7070 ; fax +1 800 456 3227
information@emf-corp.com; www.emf-corp.com

Featured Product: Optical Coatings - Reflective Coatings, AR, Dielectric, Oleophobic, Hot/Cold Mirrors, HEAR, IR
EMF -most established thin film coating house in US- founded in 1936. Get the EMF Edge - *Same day service capability *On time delivery > 99% *Product Quality > 99% *Application/Technical Engineering Support *Precision Custom coatings, Very High Volume coatings and Large Optic capability. Capability to coat both small & large optics ranging from 2mm to 2.6 meters. Largest capacity in the industry- 27 chambers across 2 sites. We coat Glass, Metal, Ceramic, Composite & Plastic substrates. Contact: Michelle Henderson, Sales Account Manager, michelle@emf-corp.com; John McCartney, Sales Engineer, jmccartney@emf-corp.com

Energetiq Technology, Inc. #652
7 Constitution Way, Woburn, MA, 01801-1024 USA
+1 781 939 0763
info@energetiq.com; www.energetiq.com

Featured Product: 5th Generation Laser-Driven Light Sources
Energetiq Technology is the world’s leading developer and manufacturer of ultra-bright broadband light sources for a wide variety of advanced applications in life and materials sciences, semiconductor manufacturing, and R&D. Energetiq’s Laser-Driven Light Sources (LDLS) are based on a revolutionary technology that generates high brightness across the spectrum, with high reliability and long life. Contact: Mae Steinberg, Marketing Specialist, msteinberg@energetiq.com

Epner Technology Inc. #561
78 Kingsland Ave, Brooklyn, NY, 11221-5603 USA
+1 718 782 5948
info@epner.com; epner.com

Ferrotec (USA) Corp. #542
3945 Freedom Cir Ste 450, Santa Clara, CA, 95054 USA
+1 408 964 7700; fax +1 408 361 7775
info@ferrotec.com; www.ferrotec.com

Featured Product: Electron Beam Evaporation Components
Ferrotec is a world leader in advanced material, component, and system solutions. Ferrotec offers Temescal electron beam evaporation solutions including systems, e-guns, power supplies and controllers for optical fabrication and precision coating applications. Ideal for new systems, replacements and upgrades. See a live demonstration of the multi-function TemEBeam EBC Integrated E-Beam Controller and the FerroVac vacuum controller. For more information, visit www.ferrotec.com.
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<tr>
<td><a href="mailto:info@fto.ca">info@fto.ca</a>; <a href="http://www.fto.ca">www.fto.ca</a></td>
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**Featured Product:** Specialty fiber optic assemblies, bundles, arrays

Leading designer and manufacturer of specialty fiber optic solutions including assemblies, ultra high power fiber-coupled multi-wavelength LED sources and vacuum feedthroughs. Offering Raman probes, micro-lens assemblies, round to line converters, reflectance probes, v-groove arrays, fiber bundles, patchcords, low FRD cables, and high power laser cables with multimode, singlemode and borosilicate fibers. Fiber options available for applications with wavelengths from the deep UV to the MIR. Contact: Jeff Dupuis, VP Sales & Marketing, jeffdup@fto.ca; Cheryl Provost, Sales Engineer, cprovost@fto.ca

| **GPD Optoelectronics Corp.** #562 |
| 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 |

**Featured Product:** InGaAs/InGaAs two-color sensor for non-contact temperature measurements.

GPD Optoelectronics, a global supplier of Ge & InGaAs photodiodes operate in the 0.8 to 2.6 micron short wave infrared (SWIR) spectrum. The Ge & InGaAs photodiodes are available in die on carrier, TO package, TEC module, singlemode/multimode fiber (with high reliability packaging), SMA/FC/SC/ST receptacles, & custom designs. InGaAs APDs with numerous packaging options are available. GPD has “Si over Si or Ge or InGaAs” and “InGaAs over InGaAs” two-color “sandwich” sensors for ratio pyrometry. Contact: Rufus Ward, President, rward@gpd-ir.com; George Gasparian, Sales/Applications Engineer, ggasparian@gpd-ir.com

| **Filmetrics, Inc.** #645 |
| 10655 Roselle St Ste 200, San Diego, CA, 92121 USA |
| +1 858 573 9300; fax +1 858 573 9400 |
| info@filmetrics.com; www.filmetrics.com |

**Featured Product:** The world’s first $25K 3D optical profiler: the Profilm3D measures step height, roughness, and more

Filmetrics designs, manufactures, and sells instrumentation used to characterize thin films and precision-engineered surfaces. Filmetrics instruments can measure thin-film and substrate thicknesses from angstroms to millimeters and are used in thousands of applications, like surface roughness & finish, hard coat thickness, and ophthalmic coatings to name a few. Filmetrics provides value, quality, and unsurpassed support to ensure that customers get the product configuration they need.

| **Grinding and Dicing Services, Inc** #732 |
| 925 Berryessa Rd., San Jose, CA, 95133-1002 USA |
| +1 408 451 2000; fax +1 408 451 2001 |
| sales@wafergrind.com; www.wafergrind.com |

| **GS Plastic Optics** #656 |
| 408 St Paul St, Rochester, NY, 14605-1788 USA |
| +1 585 295 0200; fax +1 585 232 2314 |
| info@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: John Villareale, Account Executive, jvillareale@gsoptics.com; Will Beich, Director of Sales and Marketing, wbeich@gsoptics.com

| **Fresnel Technologies Inc.** #431 |
| 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:** LSR (silicone) optics for high temperatures and the ultraviolet.

Fresnel Technologies, Inc. makes molded plastics Fresnel lenses, general optics, infrared-transmitting materials and optics made from them. Specialties are lens arrays for the passive infrared, diffusers and microlens arrays for illumination, optics for 3.4 micrometers, and silicone optics for the UV. Design assistance, tooling and production are available. We also offer diamond machining for prototyping, tooling and production, including five-axis diamond machining of freeform optical surfaces. Contact: Oscar Lechuga, Technical Staff, info@fresneltech.com; Nelson Claytor, President, nclaytor@fresneltech.com

| **Hamamatsu Corp.** #463 |
| 360 Foothill Rd, Bridgewater, NJ, 08807-2932 USA |
| +1 908 231 0960; fax +1 908 231 1539 |
| marcom@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.  #545
87679 Kehl Ln, Bandon, OR, 97411-0090 USA
+1 541 347 9467
optics@hardinoptical.com; www.hardinoptical.com

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. Contact: optics@hardinoptical.com

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80 Skyline Dr, Plainview, NY, 11803-2518 USA
+1 516 939 0888; fax +1 516 939 0555
info.usa@hellma.com; www.hellmausa.com

Contact: Evan Friedmann, Vice President, info.us@hellma.com; Bryan Fields, Trade Show Coordinator, bryan.fields@hellmausa.com

Heraeus Tenevo LLC  #662
100 Heraeus Blvd, Buford, GA, 30518-3456 USA
+1 678 714 4350; fax +1 678 714 4355
sales.hsq.optics.us@heraeus.com; www.optics.heraeus-quarzglas.com

Featured Product: Mueller Matrix Polarimeter
Hinds Instruments manufactures instrumentation for Mueller and Stokes polarimetry, birefringence measurement and remote sensing applications. The Mueller polarimeter measures all 16 Mueller matrix elements, all 6 polarization parameters, and linear & circular retardation with no moving parts. The Mueller polarimeter has a spectroscopic wavelength range from 215nm – 850nm. The Stokes polarimeter is available either entry level (rotating waveplate) VIS & IR or research grade (dual PEM) DUV to MIR. Contact: Connie Wimmer, Sales Engineer, sales@hindsinstruments.com; Deion Mock, Sales Engineer, sales@hindsinstruments.com

Hinds Instruments, Inc.  #453
7245 NE 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: Mueller Matrix Polarimeter
Hinds Instruments manufactures instrumentation for Mueller and Stokes polarimetry, birefringence measurement and remote sensing applications. The Mueller polarimeter measures all 16 Mueller matrix elements, all 6 polarization parameters, and linear & circular retardation with no moving parts. The Mueller polarimeter has a spectroscopic wavelength range from 215nm – 850nm. The Stokes polarimeter is available either entry level (rotating waveplate) VIS & IR or research grade (dual PEM) DUV to MIR. Contact: Connie Wimmer, Sales Engineer, sales@hindsinstruments.com; Deion Mock, Sales Engineer, sales@hindsinstruments.com

II-VI Optical Systems  #838
36570 Briggs Rd, Murrieta, CA, 92563-2347 USA
+1 951 926 2994; fax +1 951 926 1984
opticalsystems.info@ii-vi.com; www.opticalsystems.com

Featured Product: Altitude Compensated Lens – Visible (Athermal)
II-VI Optical Systems is a premier solutions provider for the design, development, and production of integrated optical components, optical assemblies, and optical systems for advanced applications. From prototypes to production, we design, manufacture, assemble, and test precision optical systems and components-including visible, infrared, and laser-based systems and subassemblies. II-VI Optical Systems is ISO 9001/AS9100/ISO 13485 Registered. Contact: Janice Roewer, Inside Sales Manager, janice.roewer@ii-vi.com; Alex Pete, Imaging Product Line Manager, alex.pete@ii-vi.com

Ibsen Photonics A/S  #106
Ryttermarken 15-21, Farum, 3520 Denmark
+45 44 34 7000; fax +45 44 34 7001
inquiry@ibsen.dk; www.ibsen.com

Featured Product: FREEDOM HR-DUV spectrometer combined with DISB electronics is ideal for handheld LIBS.
Ibsten Photonics is a global leader in transmission gratings and OEM spectrometer modules for a wide range of telecom, analytical, sensing, and laser markets. Spectrometer products: 1) FREEDOM for ultra-compact size 2) ROCK for high throughput 3) EAGLE for high resolution and 4) I-MON interrogation monitors for FBG sensing. Grating products: 1) Phase masks for FBG writing 2) PCG for laser pulse compression 3) PING for telecom WSS, tunable filters, and OCM’s and 4) Spectrometer gratings. Contact: Kristian Buchwald, VP Gratings, kjb@ibsen.com

HOYA Corp. USA  #633
Optics Div, 680 N McCarthy Blvd Ste 120, Milpitas, CA, 95035 USA
+1 408 654 2200; fax +1 408 654 2270
opticsales.hoyausa@hoya.com; www.hoyaoptics.com

Featured Product: UV Transmitting – Visible Blocking, Neutral Density, Sharp Cut, NIR, Visible filters & optical glass
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 Color Filter, Optical & Specialty glasses in various forms: Lenses, blanks, strips & blocks. Contact: Lynn Brown, Division Manager, lynn.brown@hoya.com; Sean Wilson, Sales Engineer, sean.wilson@hoya.com

Hardin Optical Co. manufactures an extensive line of linear motion components, positioning systems and complete automation solutions. Supplying superior quality at the most competitive prices, HIWIN offers a variety of precision ground and rolled ballscrews, linear guideways, electric actuators, ballscrew-driven stages, rotary and linear motors and articulating robots with fully integrated value-added features. Contact: Shawn Lawrence, Marketing Manager, s.lawrence@hiwin.com; Roxanna Roska, tradeshow@hiwin.com

HIWIN Corp  #100
12455 Jim Dhamer DR, Huntley, IL, 60142 USA
+1 847 827 2270; fax +1 847 827 2291
info@hiwin.com; www.hiwin.com

HIWIN Corp. manufactures an extensive line of linear motion components, 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. Contact: optics@hardinoptical.com

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100 Heraeus Blvd, Buford, GA, 30518-3456 USA
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sales.hsq.optics.us@heraeus.com; www.optics.heraeus-quarzglas.com

Hinds Instruments manufactures instrumentation for Mueller and Stokes polarimetry, birefringence measurement and remote sensing applications. The Mueller polarimeter measures all 16 Mueller matrix elements, all 6 polarization parameters, and linear & circular retardation with no moving parts. The Mueller polarimeter has a spectroscopic wavelength range from 215nm – 850nm. The Stokes polarimeter is available either entry level (rotating waveplate) VIS & IR or research grade (dual PEM) DUV to MIR. Contact: Connie Wimmer, Sales Engineer, sales@hindsinstruments.com; Deion Mock, Sales Engineer, sales@hindsinstruments.com

II-VI Optical Systems is a premier solutions provider for the design, development, and production of integrated optical components, optical assemblies, and optical systems for advanced applications. From prototypes to production, we design, manufacture, assemble, and test precision optical systems and components-including visible, infrared, and laser-based systems and subassemblies. II-VI Optical Systems is ISO 9001/AS9100/ISO 13485 Registered. Contact: Janice Roewer, Inside Sales Manager, janice.roewer@ii-vi.com; Alex Pete, Imaging Product Line Manager, alex.pete@ii-vi.com

Hinds Instruments manufactures instrumentation for Mueller and Stokes polarimetry, birefringence measurement and remote sensing applications. The Mueller polarimeter measures all 16 Mueller matrix elements, all 6 polarization parameters, and linear & circular retardation with no moving parts. The Mueller polarimeter has a spectroscopic wavelength range from 215nm – 850nm. The Stokes polarimeter is available either entry level (rotating waveplate) VIS & IR or research grade (dual PEM) DUV to MIR. Contact: Connie Wimmer, Sales Engineer, sales@hindsinstruments.com; Deion Mock, Sales Engineer, sales@hindsinstruments.com

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<td>+1 508 909 2200; fax +1 508 909-2323</td>
</tr>
<tr>
<td><a href="mailto:sales@incomusa.com">sales@incomusa.com</a>; <a href="http://www.incomusa.com">www.incomusa.com</a></td>
</tr>
<tr>
<td>Incom is a manufacturer of glass and polymer fused fiber optic face plates and tapes, as well as polymer and glass micro structures. Our products have made critical contributions to drug research, medical applications, and military and homeland security. We have participated in the design and development of large format tapes for X-ray crystallography, microwell arrays for genome sequencing, 17”x17” face plates for medical X-ray, and microcapillary arrays for TOF and neutron detection. Contact: Jeff Solari, Director of Business Development, <a href="mailto:jbs@incomusa.com">jbs@incomusa.com</a></td>
</tr>
</tbody>
</table>

| **Infinite Optics Inc.** | #436 |
| 1712 Newport Ctr 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: Salt Resistant Coatings for Severe Environments & High Efficiency AR Coatings on 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 |

| **Inrad Optics** | #1001 |
| 181 Legrand Ave, Northvale, NJ, 07647 USA |
| +1 201 767 1910; fax +1 201 767 9644 |
| sales@inradoptics.com; www.inradoptics.com |
| Inrad Optics partners with industry leaders to produce precision optical components and assemblies. From large opto-mechanical windows to thin electro-optical crystals, our expertise offers the widest range of materials available. Visit us at booth 1001 to discuss how our materials expertise can take your optical design to the production floor. Contact: Sales, sales@inradoptics.com |

| **IOP Publishing** | #836 |
| Temple Circus, Temple Way, Bristol, BS1 6HG United Kingdom |
| +44 117 929 7481 |
| custserv@iop.org; www.ioppublishing.org |
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| **Isuzu Glass, Inc.** | #357 |
| 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: ISK Series - Heat absorbing Filters, Aspheric Lens, Micro Lens Array, Integrated Lens Array.** |
| For around 110 years, Isuzu Glass has been developing original techniques and know-how and supplying a variety of optronics products to customers using unique manufacturing methods. Isuzu Glass is a supplier of Integrated Lens Arrays, Micro Lens Arrays, Aspheric Lens. Heat absorbing and Laser Protection Glass and UV absorbing Filters and Color Correction Filters. Contact: Hiro Yokoi, President, sales@isuzuglass.com; Naoko Kaga, Vice President, sales@isuzuglass.com |

| **J.A. Woollam** | #452 |
| 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 |
| For all your ellipsometry needs, from measuring your thin film sample to the installation and training of your very own ellipsometer, the J.A. Woollam Company is here for you every step of the way. Contact us today to learn more about the variety of spectroscopic ellipsometers we provide to help you characterize your thin films. Email us today at sales@ jawoollam.com or visit us on the web at www.jawoollam.com. |

| **JENOPTIK Optical Systems, LLC** | #551 |
| 16490 Innovation Dr, Jupiter, FL, 33478-6428 USA |
| +1 561 881 7400; fax +1 561 881-1947 |
| sales@jenoptik-inc.com; www.jenoptik-inc.com |
| **Featured Product: Imaging Systems and Projection Lenses** |
| Jenoptik Optical Systems designs and builds high performance lenses and camera systems for life science, semiconductor equipment, defense and entertainment. Our innovative products are used around the world in diagnostic instruments, semiconductor tools, security systems and projection systems. Our micro optics group delivers hardware for information and communications technology (ICT), consumer electronics and for semiconductor equipment. We are ISO 13485 certified and ITAR compliant. Contact: Ray Malcom, VP; Sales & Marketing, ray.malcom@jenoptik-inc.com |

| **KOHZU Precision Co., Ltd. c/o Daniel F Crews LLC** | #728 |
| PO Box 2804, Evergreen, CO, 80437-2804 USA |
| +1 303 944 1082 |
| kohzu@dfcrews.com; www.dfcrews.com |
| **Featured Product: Production / Precision Grade Automated Stages, Metrology Systems & Scientific Synchrotron Equipment** |
| KOHZU Precision Co., Ltd was established in 1945 and is a leading supplier of PRECISION STAGES (X, XY, Z, Tip/Tilt) to Education, Research, Government, Synchrotrons and Production / Industry. Daniel F Crews, LLC as the Exclusive North America Distributor offers nearly 30 years of automation expertise thus providing the highest level of customer service possible. Contact: Dan Crews, President, kohzu@dfcrews.com |
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Rapport Kayabacho Sankei Bldg 602, 2-2-2 Nihonbashi-kayabacho, Chuo-ku, 103-0025 Japan
+81 3 3666 1896; fax +81 3 3666 0425
harigai@kokusaishoji.co.jp; www.kokusaishoji.co.jp

LABSPHERE, INC. #737
PO Box 70, North Sutton, NH, 03260-0070 USA
+1 603 927 4266; fax +1 603 927 4694
labsphere@labsphere.com; www.labsphere.com

FEATURED PRODUCT: CRYOGENIC PROBE STATIONS FOR ELECTRO-OPTICAL, DC, RF, MICROWAVE, OR THZ-FREQUENCY DEVICE MEASUREMENT

Lake Shore Cryotronics, Inc. #460
575 McCorkle Blvd, Westerville, OH, 43082-8699 USA
+1 614 891 2244; fax +1 614 818 1600
info@lakeshore.com; www.lakeshore.com

FEATURED PRODUCT: TRACEPRO 7.8, RAYVIZ 7.8 AND OSLO 7

Lambda Research Corp. #664
25 Porter Rd, Littleton, MA, 01460-1434 USA
+1 978 486 0766; fax +1 978 486 0755
sales@lambdares.com; www.lambdares.com

FEATURED PRODUCT: TRACEPRO

Laser Focus World #438
PennWell Technology Div, 61 Spit Brook Rd Ste 401, Nashua, NH, 03060-5614 USA
+1 603 891 0123; fax +1 603 891 0574
info@laserfocusworld.com; www.laserfocusworld.com

FEATURED PRODUCT: LASER FOCUS WORLD

LEONI Fiber Optics #855
209 Bulifants Blvd, Williamsburg, VA, 23188-5729 USA
+1 757 258 4805; fax +1 757 258 4694
cusme-s.contact@leoni.com; www.leoni-northamerica.com

FEATURED PRODUCT: FIBER OPTICS

LightTrans International UG #760
Kahlaische Str 4, Jena, 07745 Germany
+49 36 41 5312950; fax +49 36 41 5312901
service@lighttrans.com; www.lighttrans.com

FEATURED PRODUCT: VIRTUALLAB FUSION – FAST PHYSICAL OPTICS MODELLING AND DESIGN SOFTWARE

Laser Quantum Inc. #433
3083 Lawrence Expy, Santa Clara, CA, 95051 USA
+1 408 510 0079; fax +1 408 352 6192
info@laserquantum.com; www.laserquantum.com

Laser Quantum is a world-class manufacturer of revolutionary solid-state and ultrafast lasers. Our products lead the industry in performance specifications, reliability, compactness and operational lifetime. You will find Laser Quantum lasers used in laboratories and integrated in systems and machines worldwide. Our lasers are helping scientists to break new ground in many applications ranging from attosecond physics to forensics and genomics. Visit www.laserquantum.com for more information. Contact: Barney Mitchell, Vice President of Sales and Marketing, bmitchell@laserquantum.com; Dave Stockwell, Product Specialist - Ultrafast, dstockwell@laserquantum.com

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High Tech Rochester, 150 Lucius Gordon Drive Ste 100, West Henrietta, NY, 14586-9687 USA
+1 585 214 2400; fax +1 585 272 0054
info@ltr.org; www.luminate.org

Luminate is a startup accelerator focused on advancing next generation optics, imaging, and photonics enabled companies. We seek visionary entrepreneurs who are solving difficult problems in Augmented and Virtual Reality, Autonomous Vehicles, Machine Vision, Biophotonics, and other fields. Funded by New York State, and based in the optics and imaging capital of the world – Rochester, NY

Luxel Corp. #552

Luxel is the world’s leading producer of ultra-thin freestanding filters used for soft x-rays and extreme ultraviolet light. Luxel products, including space flight filters, pressure windows, and imaging sensor protectors, are assembled in Class 5 cleanrooms. Filters are fabricated from over 70 different materials, as thin as 8 nm up to 20 µm. We offer extensive technical support including thin film modeling, characterization, and CAD design. Lead times can be as short as 1 week.

www.luxel.com

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

Mad City Labs., Inc. #359

Mad City Labs designs and manufactures high precision, piezo nanopositioning and micropositioning systems for research and industry. Our products feature innovative flexure guided stages with proprietary low drift PicoQ sensor technology and closed loop control, piezoactuators, and piezomotors. System attributes include picometer precision, high speeds, real time position sensing. Suitable for inspection, metrology, microscopy, imaging and beam steering applications.

Custom/OEM specialist. Contact: Shannon Ghorbani, Technical Sales, shannon@madcitylabs.com; Ferdinando Ciceri, Technical Sales - Europe, ferdi@madcitylabs.eu

Mahr #435

150 N Tucson Blvd, Tucson, AZ, 85716-4740 USA
+1 520 296 3068
sales@esdimetrology.com; esdimetrology.com

Featured Product: MAROPTO FI 2100 AS - Sub-Nyquist Fizeau for aspheric and freeform surfaces

Mahr has over 150 years’ experience in manufacturing dimensional metrology tools from handheld gages to advanced measurement systems for form, contour, surface finish and length. Mahr produces custom engineered gages and provides calibration and contact measurement services. Mahr also provides optical metrology solutions for astronomical, aerospace, automotive, and optical production applications. Contact: Steve Moore, Applications, steve.moore@mahr.com; Mason Wilson, Applications, mason.wilson@mahr.com

Meadowlark Optics, Inc. #738

5964 Iris Pkwy, Frederick, CO, 80504 USA
+1 303 833 4333; fax +1 303 833 4335
sales@meadowlark.com; www.meadowlark.com

Featured Product: High-Speed Shutters/Rotators, Large Visible - MWIR Crystal Waveplates, 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, Pockels Cells and more. We can also customize a solution for your unique application. Ask about our in-house fabrication services and custom capabilities. Contact: Kelly Gregorak, VP in Sales & Marketing, sales@meadowlark.com

Metrology Concepts #843

3495 Winton Pl, Bldg E 120, Rochester, NY, 14623-2824 USA
+1 585 427 9155; fax +1 585 427 9026
info@metrologyconcepts.com; www.metrologyconcepts.com

Featured Product: Optocraft Shack-Hartmann wavefront sensor for alignment and measurement of wavefronts and assemblies

Metrology Concepts specializes in surface and wavefront measurement solutions; utilizing interferometry and Shack-Hartmann wavefront sensing. We offer standard and custom instruments, upgrades to existing metrology as well as training and measurement services. Founded in 2006 following a management buyout of Fisba Optik’s US interferometer subsidiary, we are the exclusive distributor in North America for Optocraft Shack-Hartmann and MBDA Interfire II products.
LIGHT SOURCES
Introducing the Lambda 421 Optical Beam Combiner, a newly patented concept for combining separate light sources with different spectra into a single output beam. We have a wide selection of high-powered LEDs, the highly stable Lambda XL plasma light source and Lambda LS Xenon arc lamp.

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A broad line of robust and reliable wavelength switching products including the Lambda 10-3 controller which controls up to 3 wheels and 2 shutters. For tunable filters, single and 5-position filter changers provide access to any center bandpass from 338 to 900nm in nanometer increments. Our SmartShutter® offers the most sophisticated shutter control available.

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NSOM TIPS
Sutter Instrument, the recognized leader in micropipette fabrication technology, offers leading edge technology in the P-2000 micropipette puller, which allows for fast and repeatable nanospray tip production with complete control of tip morphology. The P-2000 can be pre-programmed to produce tips to your specifications at no extra charge.

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EMAIL: INFO@SUTTER.COM | WWW.SUTTER.COM
## EXHIBITOR DIRECTORY

### Micro Laser Systems, Inc. #361
**Contact:** Linda Kondris, Technical Sales, linda@mindrum.com; Anthony Pinder, President, tony@mindrum.com

**Address:**
12841 Western Ave Ste H, Garden Grove, CA, 92841-4025 USA

**Contact Information:**
+1 714 898 6001
sales@microlaser.com; www.microlaser.com

**Featured Product:** 100mm Fiber Collimator for Free Space Communications

Come see our products for Free Space Communications, Lidar, Materials Processing and Metrology. Our offerings include Large Fiber Collimators for 1550nm communications, 905nm to 1550nm Fiber Collimators for small to kilometers distances used in Lidar. Fiber Focusers that generate small spots for material processing and high stability lasers for interferometry, sensing and scanning. We manufacture diode lasers and optical systems from UV to mid IR for your requirements. Contact: Norma Adachi, Marketing, norma@microlaser.com

### Micro-LAM Inc. #644
**Contact:** Chris Stroshine, Global Sales Manager, chris.stroshine@microlam.com

**Address:**
5960 S. Sprinkle Rd, Portage, MI, 49002 USA

**Contact Information:**
+1 269 288 4100
info@micro-lam.com; www.micro-lam.com

**Featured Product:** Optimus T+1, Laser Assisted Machining Device

Micro-LAM Inc. offers cutting edge technology, through a state of the art, retrofittable accessory for ultra-precision machine tools, that has become a game changer for optical fabrication. The Optimus T+1, Laser Assisted Machining device mounts conveniently in place of a standard tool post, to preferentially heat the material, precisely at the point of diamond contact. This process significantly improves surface quality, figure accuracy and throughput for conventionally diamond turned optics. Contact: Chris Stroshine, Global Sales Manager, chris.stroshine@micro-lam.com; Deepak Ravindra, CEO, deepak.ravindra@micro-lam.com

### Mindrum Precision, Inc. #461
**Contact:**
10000 4th St, Rancho Cucamonga, CA, 91730-5723 USA
+1 909 989 1728; fax +1 909 987 3709
sales@mindrum.com; www.mindrum.com

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Linda Kondris, Technical Sales, linda@mindrum.com; Anthony Pinder, President, tony@mindrum.com

### Minus K Technology Inc. #439
**Contact:**
stevev@minusk.com; www.minusk.com

**Address:**
Suite C, 460 Hindry Ave, Inglewood, CA, 90301 USA
+1 310 348 9656; fax +1 310 348 9638

**Featured Product:** New LC-4 isolator supports heavier payloads, requires no air or electricity and uses little room

Manufacturer of vibration isolation systems for AFMs, SPMs, SEMs, metrology, micro-hardness testers, lasers and optics. They are low-cost, passive, vacuum adaptable and require no air or electricity. Products: table-top platforms, workstations, floor platforms and custom systems. Guaranteed 1/2 Hz natural frequencies make them effective against low-frequency building vibrations. Isolation is typically 10 to 100 times better than air tables and even better than the higher-priced active systems.

### MKS Instruments #353
**Contact:**
Tom Miller, Director of Sales, tom.miller@newport.com

**Address:**
1791 Deere Ave, Irvine, CA, 92606-4814 USA
+1 949 863 3144; fax +1 949 253 1680
www.mksinst.com

**Featured Product:**
MKS Instruments, Inc. is a global provider of instruments, subsystems and process control solutions that measure, control, power, monitor, and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. Our primary served markets include semiconductor capital equipment, industrial manufacturing, environmental, medical, life sciences and scientific research. Additional information can be found at www.mksinst.com. Contact: Tom Miller, Director of Sales, tom.miller@newport.com

### MOXTEK, Inc. #465
**Contact:**
dcrawford@moxtek.com

**Address:**
452 West 1260 North, Orem, UT, 84057-2941 USA
+1 801 225 0950; fax +1 801 221 1121
info@moxtek.com; www.moxtek.com

**Featured Product:**
MOXTEK® is an advanced research company designing and manufacturing high performance components for analytical x-ray instrumentation and optical systems. Moxtek® optical polarizers and beamsplitters enable advancements in projection display and analytical instrumentation including: office and home projection, near-eye display, 3D projection, television technology, and optical analysis instrumentation. Contact: Dave Crawford, Optics Sales Manager, dcrawford@moxtek.com

### MPS Micro Precision Systems AG #833
**Contact:**
info@mpsag.com; www.mpsag.com

**Address:**
Chemin du Long-Champ 95, Biel/Bienne 8, 2504 Switzerland
+41 32 344 43 00; fax +41 32 344 43 01

**Featured Product:**
MPS develops and manufactures electro-mechanical microsystems used in different fields of applications such as Medical, Automation, Optics, Aerospace and Science. MPS microsystems are characterised by their miniaturisation, 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: Peter Brombach, Sales Manager, peter.brombach@mpsag.com; Gregoire Bagnoud, Director Business Development, gregoire.bagnoud@mpsag.com
Naked Optics Corp.  
1090 Delacroix Cir, Nokomis, FL, 34275-4563 USA  
+1 908 685 0352  
sales@nakedoptics.com; www.nakedoptics.com

National Institute of Standards and Technology  
ADLP, MS 6000, 100 Bureau Dr, Gaithersburg, MD, 20899 USA  
+1 301 975 8362  
www.nist.gov  
NIST’s laboratories collaborate with U.S. industry and universities to conduct measurement, standards, and technology research that advances the nation’s R&D infrastructure. The overarching goal of the NIST laboratory programs is to accelerate U.S. innovation, which is a major driver of economic growth and job creation.

Navitar Inc.  
200 Commerce Dr, Rochester, NY, 14623-3506 USA  
+1 585 359 4000; fax +1 585 359 4999  
info@navitar.com; www.navitar.com  
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Newport Corporation  
1791 Deere Ave, Irvine, CA, 92606-4814 USA  
+1 949 863 3144  
sales@newport.com; www.newport.com  
Newport, now part of MKS Instruments, is the world’s largest photonics company providing innovative solutions and industry leading product brands to multiple markets. Our combined product portfolio includes Corion®, ILX Lightwave™, New Focus™, Ophir, Oriel® Instruments, Richardson Gratings™, and Spectra-Physics® Lasers. We provide complete photonic solutions to make, manage and measure light. Contact: Bill Casey, Director of Marketing, bill_casey@mksinst.com

Newport Thin Film Laboratory, Inc.  
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  
NTFL is a fully equipped clean room coating facility specializing in the design and manufacture of vacuum deposited optical thin films in the ultraviolet, visible and infrared spectrum. We produce a wide variety of coatings most of which are designed and manufactured to specific customer specifications. Our large chambers allow us high volume capabilities resulting in competitive pricing. However, we also work closely with you to develop prototypes samples as well. Contact: Ever Mata, Sales, emata@newportlab.com; Scott Powers, Engineering, pspowers@newportlab.com

Nikon Corporation  
1399 Shoreway Rd, Belmont, CA, 94002 USA  
+1 650 454 7360  
naoyasu.uehara@nikon.com; www.nikon.com  
Featured Product: Synthetic silica glass, calcium fluoride, optical glass, raw material, blanks, finished optics.  
Nikon began research, development and production of optical glass materials in 1918, the year after the establishment of Nippon Kogaku K.K. (Nikon Corporation). By leveraging this vast history of technology, Nikon produces industry-leading synthetic silica glass and calcium fluoride materials. As well as the most advanced photomask substrates for FPD applications, lenses for semiconductor lithography systems and optical components for many other demanding applications. Contact: Naoyasu Uehara, Sales and Marketing, naoyasu.uehara@nikon.com

NKT Photonics  
3514 N Vancouver Ave Ste 310, Portland, OR, 97227-2026 USA  
+1 503 444 8404  
sales-us@nktphotonics.com; www.nktphotonics.com  
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EXHIBITOR DIRECTORY

Optics.org #651
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+44 29 2089 4747; fax +44 29 2089 4750
sales@optics.org; www.optics.org

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OptoSigma Corp. #755

Osela Inc. #654

OptiPro Systems #1004

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Optosigma Corporation offers both catalog and custom precision laser optics, custom optical coatings, opto-mechanical positioning systems, motorized positioning systems and optical assemblies. Global manufacturing provides OEM pricing without sacrificing quality and precision. Call 949-851-5881 or email to sales@optosigma.com for sales and engineering support. OptoSigma is your first choice for all of your needs. Go to www.optosigma.com and request your free catalog. Contact: Dan Denison, Sales Manager, dan@optosigma.com; Clayton Summers, Engineering Manager, clayton@optosigma.com

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. Contact: Tony Marzilli, Sales Manager, tmarzilli@osela.com; Dilon Varusha, Sales, dvarusha@osela.com

Optimal Systems, Inc. #534

OptiPro Systems
6368 Dean Pkwy, Ontario, NY, 14519-8970 USA
+1 585 265 0160; fax +1 585 265 9416
sales@optipro.com; www.optipro.com

Featured Product: PRO 160 Series: High performance machines for manufacturing spheres & aspheres up to Ø 160mm.

OptiPro Systems, located in Rochester, NY, has 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: Mike Bechtold, President, mike@optipro.com; Ron Colavecchia, Director of Optics Technology, rcolavecchia@optipro.com

OptiPro makes laser optics for demanding applications – aspheres, cylinders, prisms, spheres, and freeforms. While remaining committed to small volume, high quality, and quick delivery, we support many prototype and research projects each year, including 1 piece requirements. As America’s largest precision optics manufacturer, OptiPro also offers production capabilities up to 10,000 units per year. We enjoy a good challenge – how can we help you? Contact: Joe Spilman, Sales Manager, jspilman@optimaxsi.com

Optformex offers production capabilities up to 10,000 units per year. We enjoy a good challenge – how can we help you? Contact: Joe Spilman, Sales Manager, jspilman@optimaxsi.com

Yvonne Chao, International Sales & Key Account Manager, ychao@optikos.com. Contact: Jim Scott, Key Account Manager, jscott@optikos.com; Clayton Summers, Engineering Manager, clayton@optosigma.com

Featured Product: Optical Metrology and Engineering Design

Optikos Corp.

Featured Product: Lasers

Osela Inc.

Featured Product: New Cage System! Various holders for 1/2” and 1” optics. Tight tolerance, high quality, rigid.

OptiPro is a leading manufacturer of laser optics, custom coating OptiPro is a leading manufacturer of laser optics, custom coating

OptiPro is a leading manufacturer of laser optics, custom coating

OptiPro Systems, located in Rochester, NY, has 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: Mike Bechtold, President, mike@optipro.com; Ron Colavecchia, Director of Optics Technology, rcolavecchia@optipro.com
OZ Optics Ltd. #455

**SPONSOR**

W Carleton Industrial Park, 219 Westbrook Rd, Ottawa, ON, K0A 1L0 Canada
+1 613 831 0981; fax +1 613 836 5089
sales@ozoptics.com; www.ozoptics.com

**Featured Product:** Online Catalog
OZ Optics Limited is pleased to announce our new online catalog (shop. ozoptics.com). Thousands of fiber optic products in stock; Stock items are shipped within 1 or 2 business days; Excess Inventory as much as 75% off. It provides you an easier and faster way to do business. We offer thousands of fiber optic products available from stock, ready to ship within one or two business days. In addition, we have some real bargains available, at up to 75% off the original price. Contact: Omur Sezerman, CEO & President, sales@ozoptics.com; Yesim Sezerman, Marketing Manager, ysezerman@ozoptics.com

PerkinElmer, Inc. #564

940 Winter St, Waltham, MA, 02451 USA
+1 203 925 4602; fax +1 203 944 4904
productinfo@perkinelmer.com; www.perkinelmer.com

**Featured Product:** LAMBDA™ 1050 and Frontier™ FT-IR
PerkinElmer is a global leader committed to innovating for a healthier world. Our dedicated team of 9,000 employees worldwide are passionate about providing customers with an unmatched experience as they help solve critical issues especially impacting the diagnostics, discovery and analytical solutions markets.

PG&O - Precision Glass & Optics #363

3600 W Moore Ave, Santa Ana, CA, 92704 USA
+1 714 540 0126; fax +1 714 540 1482
info@pgo.com; www.pgo.com

**Featured Product:** PG&O offers Complete Optical Manufacturing Services from Substrates to Precision Coatings/Assemblies
PG&O delivers high quality, precision glass, optics, and optical coatings for a variety of applications. The company has an extremely large inventory of glass products and a full optical fabrication shop to provide advanced optical coatings and manufacturing large mirror blanks. Other services include CNC machining, polishing, slicing, sawing, scribing, grinding, edging, assembly, and more. With three large coating chambers & an expert, in-house engineering staff, PG&O is the one-stop shop. Contact: Dan Bukaty, Jr., President, danjr@pgo.com

Photonic Cleaning Technologies, LLC #854

Bldg 1, 1895 Short Lane, Platteville, WI, 53818 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 PolymersTM. 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, davig@photoniccleaning.com; James Hamilton, CTO, hamiltonj@photoniccleaning.com

PHASICS Corp. #765

11th Fl, 600 California St, San Francisco, CA, 94109 USA
+1 415 610 9741
contact@phasics.com; www.phasicscorp.com

**Featured Product:** Wavefront sensors (193nm-14µm) for laser beam test, adaptive optics & lens metrology (TWE + MTF)
Phasics offers high resolution wavefront sensors (up to 120 000 phase pixels) from 193nm to 14µm. Their patented technology ensures both accurate measurement 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 off-axis MTF and aberrations at several wavelengths on a same easy-to-align bench. Finally, it is a plug-&-play solution for quantitative phase microscopy. Contact: Yoann Priol, Technical sales engineer, priol@phasics.fr

Photon Engineering LLC #464

310 S Williams Blvd # 222, Tucson, AZ, 85711 USA
+1 520 733 9557; fax +1 520 733 9609
info@photonengr.com; 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, donatap@ photonengr.com

Photonic Cleaning Technologies, LLC #854

Bldg 1, 1895 Short Lane, Platteville, WI, 53818 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 PolymersTM. 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, davig@photoniccleaning.com; James Hamilton, CTO, hamiltonj@photoniccleaning.com
Photonics Online #565
2009 Mackenzie Way Ste 280, Cranberry Township, PA, 16066 USA
+1 724 940 7555; fax +1 724 779 0047
ditor@photonicsonline.com; www.photonicsonline.com

Featured Product: Online Resource For Photonics Professionals.
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, Account Executive, nmiller@vertmarkets.com; Ed Biler, Associate Editor, ebiller@vertmarkets.com

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100 West Street, 2nd Floor, Pittsfield, MA, 01201 USA
+1 413 499 0514; fax +1 413 442 3180
info@photons.com; www.photonics.com

Featured Product: Photonics Spectra magazine celebrates 50 years of covering the latest in photonics.
Since 1967, Photonics Spectra magazine has defined the science and industry of photonics, providing both technical and practical information for every aspect of this global industry and promoting an international dialogue among the engineers, scientists and end users who develop, commercialize and buy photonics products. Subscribe or renew for free. Contact: Ryan Laurin, Vice President, ryan.laurin@photons.com; Michael Wheeler, Managing Editor, michael.wheeler@photons.com

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ptpub@aip.org; www.physicstoday.org

Featured Product: Physics Today Magazine- Discount Subscription!
Physics Today is the magazine with reliable coverage you want, from fields inside and outside your own. Every month, Physics Today’s readership of 120,000+ scientists & engineers engage with authoritative content, including feature articles on peer-reviewed research & overviews of cutting-edge advances, historical perspectives & novel tools that span the physical sciences. Stay connected with developments across many fields with a discount subscription: www.physicstoday.org/conf17. Contact: Christina Unger Ramos, Marketing Manager, cunger@aip.org

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info@pe-usa.us
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2B Rosenfeld Drive, Hopedale, MA, 01747 USA
+1 508 634 6688; fax +1 508 634 6868
info@piezojena.com; www.piezojena.com

Featured Product: Digital Piezo Controller: d-Drive Pro 24bit resolution, 3 channel amp with120 mA continuous current
Piezosystem jena for 20+ years has provided high precision nanopositioning solutions in up to 5 axis of travel. X, XY, XYZ, tip/tilt positioning with sub-nm resolution can be achieved, with high resonant frequencies which allow for fast scanning. Using a closed loop feedback we can eliminate any hysteresis and drift. Complete digital systems are also readily available with micro manager and labview drivers. A leader for Research & OEM solutions. Contact: Peter Viglas, Sales Manager, pviglas@piezojena.com

PixeLINK, A Navitar Company #648
1900 City Park Dr Ste 410, Ottawa, ON, K1J 1A3 Canada
+1 613 247 1211
sales@pixeLINK.com; www.pixeLINK.com

POG Precision Optics Gera #554
1090 Delacroix Cir, Nokomis, FL, 34275-4563 USA
+1 941 803 4927
info@pog.eu; www.pog.eu

Featured Product: Optical System Design & Production
POG designs, develops and processes custom optical and EO-mechanical systems and components from the UV through IR for machine vision, semiconductor industry, aerospace and defense. POG is a leading manufacturer of custom and standard microstructures on glass and ceramics – reticules, scales, calibration targets and test patterns. In-house photolithographic processes result in the highest possible quality for serial production and small batch quantities. Contact: Buzz Nesti, Optical Engineer, buzz.nesti@pog.eu; Glen Dunn, glen.dunn@pog.eu
Precision Optical

Sales, 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

Quartus Engineering Inc.

9689 Town Ctr Dr, San Diego, CA, 92121 USA
+1 858 875 6000; fax +1 858 875 6001
sales@quartus.com; www.quartus.com

Quartus Engineering is a complete engineering solutions provider with core competencies in optical/opto-mechanical design, thermal management solutions, holographic elements and system hardware integration. Quartus can provide complete system design, address specific design/analysis needs, or integrate with a team to provide increased capabilities or bandwidth. Support is available from our industry leading finite element analysis team, including STOP analysis (Structural, Thermal and Optical.)
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<td>6830 S Dawson Cir, Centennial, CO, 80112-4208 USA</td>
<td>+1 303 371 3000; fax +1 303 371 1333</td>
<td><a href="mailto:sales@rr-optics.com">sales@rr-optics.com</a>; <a href="http://www.rr-optics.com">www.rr-optics.com</a></td>
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<td>1900 Taylor Rd, Auburn Hills, MI, 48326-1740 USA</td>
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<td>#1005</td>
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<td>#630</td>
<td>Gewerbestr 18, Allschwil, 4123 Switzerland</td>
<td>+41 61 487 22 22</td>
<td><a href="mailto:info@rolic.com">info@rolic.com</a>; <a href="http://www.rolic.com">www.rolic.com</a></td>
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<td>LCMO-optical films with high Resolution structure for polarizers and retarders</td>
<td>Contact: Ralph Scholl, Product Manager, <a href="mailto:ralph.scholl@rolic.ch">ralph.scholl@rolic.ch</a></td>
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<tr>
<td>RPMC Lasers, Inc.</td>
<td>#734</td>
<td>203 Joseph St, O Fallon, MO, 63366-2614 USA</td>
<td>+1 636 272 7227; fax +1 636 272 3909</td>
<td><a href="mailto:info@rpmclasers.com">info@rpmclasers.com</a>; <a href="http://www.rpmclasers.com">www.rpmclasers.com</a></td>
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<td>Contact: Jonathan Evans, VP, Sales, <a href="mailto:jonathan@santec.com">jonathan@santec.com</a></td>
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<td>Ruda-Cardinal, Inc.</td>
<td>#733</td>
<td>3280 E Hemisphere Loop Ste 180, Tucson, AZ, 85706 USA</td>
<td>+1 520 546 1495; fax +1 520 546 1481</td>
<td><a href="mailto:accounting@ruda.com">accounting@ruda.com</a>; ruda.com</td>
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<td>Santec U.S.A. Corp.</td>
<td>#832</td>
<td>433 Hackensack Ave, Hackensack, NJ, 07601 USA</td>
<td>+1 201 488 5505; fax +1 201 488 7702</td>
<td><a href="mailto:info@santec.com">info@santec.com</a>; <a href="http://www.santec.com">www.santec.com</a></td>
<td></td>
<td>Spatial Light Modulator SLM-100 &amp; λ Equalizer LEQ-1000</td>
<td>Contact: Jonathan Evans, VP, Sales, <a href="mailto:jonathan@santec.com">jonathan@santec.com</a></td>
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**EXHIBITOR DIRECTORY**
SCHOTT North America, Inc.  
#754
SCHOTT Advanced Optics develops products for applications in optics, lithography, astronomy, optoelectronics, life sciences, and research. Offerings include 120 optical and laser glasses, optical filters, ZERODUR® extremely low expansion glass ceramic, IR materials, and optical components. In addition, we provide custom glass development, precision finishing, and metrology capabilities. Contact: Arnie Bazensky, Reg Sales Mgr - West, arnie.bazensky@us.schott.com; David Schimmel, Marketing, david.schimmel@us.schott.com

Featured Product: 1.2 Meter Diameter Mirror With 88% Lightweighting Factor

Schrödinger  
#643
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. Schrödinger also establishes deep partnerships and collaborations with companies in such fields as biotechnology, pharmaceuticals, chemicals, and electronics.

Featured Product: Schrödinger provides tools for the quantum mechanics-based simulation of chemical systems.

Sierra Precision Optics  
#567
Sierra Precision Optics offers a huge inventory of stock filters (www.spectrogon.com) that can ship within 2 weeks. Contact: Steve Finn, Sales Manager, sales.us@spectrogon.com; Kelly Neeb, Sales Admin., sales.us@spectrogon.com

Spectral Instruments, Inc.  
#748
Spectral Instruments, Inc. 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 research and manufacturing. Spectral Instruments Corporation will also custom tailor devices to fit your needs. Contact: Theeya Howell, Trade Show Event Coordinator, reception@siskiyou.com

Spectrogon US, Inc.  
#764
Spectrogon US, Inc. 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/ stretcher 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, sales.us@spectrogon.com; Kelly Neeb, Sales Admin., sales.us@spectrogon.com

Spectroscopy Magazine  
#762
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.

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#657
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Spectroscopy Magazine  
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Featured Product: The SPIE Digital Library is the world’s largest collection of optics and photonics applied research.

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Stanford Research Systems, Inc.
1290-D Reamwood Ave, Sunnyvale, CA, 94089-2278 USA
+1 408 744 9040; fax +1 408 744 9049
info@thinkrs.com; www.thinksrs.com

Featured Product: New SR865A 4MHz & SR860 500kHz DSP Lock in Amplifiers

SRS is a leading manufacturer of test and measurement instruments, time and frequency standards, analytical instruments as well as vacuum and gas analysis products. Our products are used globally in research and industrial applications. See www.thinksrs.com for complete product, pricing and application info.

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: Portable Raman, NIR, & LIBS Analyzers. Cooled mini spectrometers, micro NIR, & handheld radiometers

StellarNet, Inc. provides low cost miniature 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 (190-2300nm), fluorimetry, optical metrology, thin film, reflectance & colorimetry, LED/Laser/Solar spectral analysis, LIBS, OES, & Raman. Contact: Jason Pierce, Business Director, jpierce@stellarnet.us

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One Digital Dr, Novato, CA, 94949-5703 USA
+1 415 883 0128; fax +1 415 883 0572
www.sutter.com

Featured Product: Lambda 421 Optical Beam Combiner - 4 high-powered LED light sources into a single output beam

U.S. manufacturer of precision devices for scientific research and industrial OEM for over 40 years. Introducing the Lambda 421 Optical Beam Combiner. A newly patented concept for combining separate light sources with different spectra into a single output beam, and BOB, a flexible open architecture upright microscope. We also make high-output LED, plasma and xenon light sources, optical filterwheels, the SmartShutter, X-Y translators, manipulators, and P-2000 laser-based NSOM fiber tip puller. Contact: Jack Belgum, Sr. VP R&D, jack@sutter.com; Alex Cooper, Director, Sales & Marketing, alex@sutter.com

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

Synopsys’ Optical Solutions Group (OSG) is one of the world’s leading developers of optical design and analysis tools, with CODE V® imaging design software, LightTools® illumination design software, LucidShape® products for automotive lighting, and RSoft™ products for photonic component and optical communications design. OSG is also an independent supplier of optical systems design services, with more than 5,000 completed projects in imaging, illumination, and optical systems engineering. Contact: Jill Tamada, Mfg. Solutions Account Manager, jtamada@synopsys.com; Laura Mickens, Marketing Manager, lmickens@synopsys.com

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Syntec Optics
515 Lee Road, Rochester, NY, 14606 USA
+1 585 768 2513; fax +1 585 464 8043
sales@syntecoptics.com; www.syntecoptics.com

Featured Product: Diamond turned & injection molded polymer optics & optical assemblies

Syntec Optics is North America’s largest, private manufacturer of custom plastic optics serving the Medical, Defense, Consumer, and Biometric Industries by producing “Precision Plastic Optics for Tomorrow’s Technologies” from our headquarters in Rochester, NY. We specialize in Design for Manufacturability, Precision Plastic Optics, Diamond Turning, Electro-Optical Assembly Opto-Mechanical Assembly, IR Optics Assembly, Coating, & Metrology. Contact: Sara Hart, Sales Manager, shart@syntecoptics.com; Steven Polvinen, President, spolvinen@syntecoptics.com
Taiyo Optics

No 2 Xiang Long Lu, Dongguan, 523326 China
+1 647-781-0968
sales@taiyooptics.com; www.taiyooptics.com

Featured Product: Optical prisms, cylindrical lenses, and other planar optical components.
Taiyo Optics is a professional supplier of prisms. We have been focusing on processing and manufacturing optical prism for more than 20 years. Our featured products including but not limited to the optical prisms, cylindrical lenses, and other planar optical components. With advanced testing instruments and strict quality control system, Taiyo Optics is dedicated to providing best quality and service to meet our customers’ needs. Contact: Olivia Li, Sales/Marketing Assistant, olivia@taiyooptics.com

TDK-Lambda Americas Inc.

405 Essex Rd, Neptune, NJ, 07753 USA
+1 732 922 9300; fax +1 732 922 1441
sales@us.tdk-lambda.com; www.us.tdk-lambda.com/hp

Tec5usa

80 Skyline Dr., Plainview, NY, 11803 USA
+1 516 653 2000
info@tec5usa.com; www.tech5usa.com

High-quality products for spectroscopy, light sources, light guides, fiber-optic switches and probes, spectrometer modules, operating electronics. (Multi-channel) spectrometer systems for multiple applications in lab or process. e.g. concentration, filter transmission, color, thin film thickness. Optical instrumentation as remote control biomass detection systems. Various software support. Custom designed components and systems. Contact: Gert Noll, General Manager, info@tec5usa.com

The Optronics Co., Ltd.

Sanken Bldg, 5-5 Shin Ogawamachi, Shinjuku-ku Tokyo, 162-0814 Japan
+81 3 3269 3550; fax +81 3 5229 7253
intl@optronics.co.jp; www.optronicsjp.com

Featured Product: OPIE 2018
The OPTICS & PHOTONICS International Exhibition is held annually in Japan with the OPTICS & PHOTONICS International Congress and focuses on optics and laser technologies involving both science and industry. Co-locating the Congress and the Exhibition bring together innovators from around the world to find future applications for the most advanced optics and lasers. Join us at this premier event—visit our booth #634 for more information. Contact: Sakae Shibasaki, s_shiba@optronics.co.jp; Yoshiharu Tsukamoto, yoshi@optronics.co.jp

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**The Univ. of Arizona**

**Featured Product: Educational and research institution**

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: John Koshel, Associate Dean for Academic Programs, jkoshel@optics.arizona.edu; Kaye Rowan, Senior Director of Development, rowan@optics.arizona.edu

**Thermo Scientific - CIDTEC**

**Featured Product: 2K x 2K Random access camera with eXtreme Dynamic Range (XDR). Radiation hard digital color cameras.**

Thermo Scientific - CIDTEC manufactures high performance UV-NIR sensitive cameras for demanding scientific imaging applications, radiation environments, and unique machine vision inspection applications. Cameras include eXtremely wide Dynamic Range (XDR) for the SpectraCAM line of scientific cameras with unparalleled linear dynamic range, as well as KiloRAD PTZ, MegaRAD and ColorRAD cameras for operation in radiation environments. Deep UV coating services are also available. Contact: Tony Chapman, Sales & Marketing Manager, tony.chapman@thermofisher.com; Suraj Bhaskaran, Engineering Manager, suraj.bhaskaran@thermofisher.com

**Thorlabs, Inc.**

As a member of the photonics community for over 25 years, Thorlabs strives to be the ultimate resource for the photonics community—a place to find the products you need to enable your experiments, as well as the information you need to get your application working. We design, develop, and manufacture system level solutions as well as building blocks for the industry; including optomechanics, motion control, optical components, laser diodes, tunable lasers, and vibration isolation systems. Contact: Anjul Loiacono, Strategic Marketing and Business Development, aloiacono@thorlabs.com; Jamie LaCouture, Trade Shows and Community Relations, jlacouture@thorlabs.com

**UCI Division of Continuing Education**

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Meadowlark Optics, Inc.
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Navitar Inc.
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OPTICS MANUFACTURING
AccuCoat Inc.
Accumold
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Andover Corp.
Applied NanoTools
Applied Surface Technologies
Apre Instruments
asphericon, Inc.
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EMF Corp.
Gavish, Inc.
GS Plastic Optics
HOYA Corp. USA
Incom, Inc.
Infinite Optics Inc.
Navitar Inc.
Navitar Inc.
Ohara Corp.
Optimax Systems, Inc.
OptoSigma Corp.
POG Precision Optics Gera
Rochester Precision Optics, LLC
Sierra Precision Optics
Syntec Optics
United Lens Company
Vital Materials Co., Ltd.

OPTICAL DATA STORAGE
AdiOptica Optical Systems GmbH

OPTOMECHANICAL COMPONENTS, DEVICES
Aerotech, Inc.
Wordingham Technologies

PHOTONIC INTEGRATION
Applied NanoTools
Micro Laser Systems, Inc.
PG&D - Precision Glass & Optics

POSITIONING EQUIPMENT, MOTION CONTROL AND ACCESSORIES
Aerotech, Inc.
attocube systems inc
HIWIN Corp
KOHZU Precision Co., Ltd. c/o Daniel F
Crews LLC
Mad City Labs, Inc.
piezosystem jena GmbH
Siskiyou Corporation
Sutter Instrument Corp.
Zaber Technologies Inc.

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Optimax Systems, Inc.

SEMICONDUCTOR MANUFACTURING
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Applied NanoTools
Applied Surface Technologies
Filmetrics, Inc.
Mahr
Optimax Systems, Inc.
Zaber Technologies Inc.

SOFTWARE
Lambda Research Corp.
LightTrans International UG
Mahr
Photon Engineering LLC
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SPECTROSCOPY DEVICES AND EQUIPMENT
Applied Surface Technologies
Fibertech Optica Inc.
Filmetrics, Inc.
Hamamatsu Corp.
Ibsen Photonics A/S
Spectral Instruments, Inc.
StellarNet, Inc.
Xenics USA, Inc.
Zurich Instruments

STRUCTURAL AND INFRASTRUCTURE SENSING
Ibsen Photonics A/S

TEST AND MEASUREMENT, METROLOGY
Applied Surface Technologies
Apre Instruments
attocube systems inc
Filmetrics, Inc.
Hinds Instruments, Inc.
KOHZU Precision Co., Ltd. c/o Daniel F
Crews LLC
Lambda Research Corp.
Mad City Labs, Inc.
Mahr
Meadowlark Optics, Inc.
National Institute of Standards and Technology
Ohara Corp.
Optikos Corp.
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Optomechanics and Optical Manufacturing
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Nanoscience
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Optics Educators
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Physiological Optics of the Eye for Engineers
Deep Learning and its Applications in Image Processing
A Crash Course on Spin Physics
Introduction to Optomechanical Design
Optomechanical Systems Engineering
Stray Light Analysis and Control

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SPIE is accredited by the International Association for Continuing Education and Training (IACET) and is authorized to issue the IACET CEU.

SPIE reserves the right to cancel a course due to insufficient advance registration.
**SPIE. OPTICS+ PHOTONICS**

**ADVANCED METROLOGY**
- Sun SC213 Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $410 / $465 / $261
- Sun SC1164 Wavefront Data Analysis (Mahajan) 1:30 pm to 5:30 pm, $450 / $505 / $277
- Mon SC1003 Optical Scatter Metrology for Industry (Stover) 8:30 am to 12:30 pm, $445 / $500 / $275
- Mon SC492 Predicting, Modeling, and Interpreting Light Scattered by Surfaces (Germer) 1:30 pm to 5:30 pm, $375 / $430 / $247

**ASTRONOMICAL OPTICS AND INSTRUMENTATION**
- Sun SC213 Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $410 / $465 / $261
- Mon SC1114 The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck) 1:30 pm to 5:30 pm, $420 / $475 / $265
- Wed SC1086 Optical Materials, Fabrication and Testing for the Optical Engineer (DeGraaf Nelson) 8:30 am to 12:30 pm, $375 / $430 / $247

**ATMOSPHERIC AND SPACE OPTICAL SYSTEMS**
- Mon SC1114 The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck) 1:30 pm to 5:30 pm, $420 / $475 / $265

**DETECTORS AND IMAGING**
- Sun SC1222 Deep Learning and its Applications in Image Processing (Narasabadi) 8:30 am to 5:30 pm, $600 / $715 / $361
- Mon SC504 Introduction to CCD and CMOS Imaging Sensors and Applications (Janesick) 8:30 am to 5:30 pm, $740 / $855 / $417
- Tue SC916 Digital Camera and Sensor Evaluation Using Photon Transfer (Janesick) 8:30 am to 5:30 pm, $655 / $770 / $383
- Wed SC194 Multispectral and Hyperspectral Image Sensors (Lomhein) 1:30 pm to 5:30 pm, $455 / $510 / $279

**NANOSCIENCE**
- Mon SC1223 A Crash Course on Spin Physics (Dyakonov) 8:30 am to 12:30 pm, $375 / $430 / $247

**OPTICAL DESIGN AND SYSTEMS ENGINEERING**
- Sun SC690 Optical System Design: Layout Principles and Practice (Greivenkamp) 8:30 am to 5:30 pm, $635 / $750 / $375
- Mon SC1112 Introduction to Electro-Optical Systems Design (Stotts) 8:30 am to 5:30 pm, $710 / $825 / $405
- Mon SC003 Practical Optical System Design (Youngworth) 8:30 am to 5:30 pm, $705 / $820 / $403
- Mon SC1114 The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck) 1:30 pm to 5:30 pm, $420 / $475 / $265
- Tue SC011 Design of Efficient Illumination Systems (Cassakly) 8:30 am to 12:30 pm, $375 / $430 / $247
- Tue SC1178 Fundamentals of Molded Optics (Symmons, Schaub) 8:30 am to 12:30 pm, $410 / $465 / $261
- Tue SC863 Introduction to Modern Optical Drawings – the ISO 10110 Standard (Aikens) 8:30 am to 12:30 pm, $375 / $430 / $247
- Wed SC912 Intermediate Lens Design (Bentley) 8:30 am to 5:30 pm, $635 / $750 / $375
- Wed SC1086 Optical Materials, Fabrication and Testing for the Optical Engineer (DeGraaf Nelson) 8:30 am to 12:30 pm, $375 / $430 / $247
- Wed SC1199 Stray Light Analysis and Control (Fest) 8:30 am to 5:30 pm, $645 / $760 / $379

**OPTICAL MATERIALS, FABRICATION AND TESTING**
- Mon SC1114 The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck) 1:30 pm to 5:30 pm, $420 / $475 / $265

**OPTICAL MATERIALS, FABRICATION AND TESTING**
- Tue SC1179 Optical Glass – Properties and Application-oriented Specification (Hartmann) 8:30 am to 5:30 pm, $645 / $760 / $379
- Wed SC1086 Optical Materials, Fabrication and Testing for the Optical Engineer (DeGraaf Nelson) 8:30 am to 12:30 pm, $375 / $430 / $247

**OPTOMECHANICS AND OPTICAL MANUFACTURING**
- Sun SC213 Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $410 / $465 / $261
- Sun Mon SC014 Introduction to Optomechanical Design (Vukobratovich) 8:30 am to 5:30 pm, $1,075 / $1,330 / $607
- Mon SC781 Optomechanical Analysis (Matheway) 8:30 am to 5:30 pm, $645 / $760 / $379
- Mon SC1114 The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck) 1:30 pm to 5:30 pm, $420 / $475 / $265
- Tue SC010 Introduction to Optical Alignment Techniques (Castle) 8:30 am to 5:30 pm, $600 / $715 / $361
- Tue SC1019 Mounting of Optical Components (Kasunic) 8:30 am to 5:30 pm, $680 / $795 / $393
- Tue SC015 Fastening Optical Elements with Adhesives (Daly) 1:30 pm to 5:30 pm, $375 / $430 / $247
- Wed SC218 Advanced Composite Materials for Optomechanical Systems (Zweisen) 8:30 am to 5:30 pm, $600 / $715 / $361
- Wed SC1086 Optical Materials, Fabrication and Testing for the Optical Engineer (DeGraaf Nelson) 8:30 am to 5:30 pm, $375 / $430 / $247
- Thu SC1120 Finite Element Analysis of Optics (Doyle, Genberg) 8:30 am to 5:30 pm, $670 / $785 / $389
- Thu SC1085 Optomechanical Systems Engineering (Kasunic) 8:30 am to 5:30 pm, $670 / $785 / $389

**REMOTE SENSING**
- Sun SC567 Introduction to Optical Remote Sensing Systems (Shaw) 1:30 pm to 5:30 pm, $375 / $430 / $247
- Wed SC1220 Imaging Spectrometry (Hagen) 8:30 am to 12:30 pm, $375 / $430 / $247
- Thu SC152 Infrared Focal Plane Arrays (Hubbs) 8:30 am to 5:30 pm, $600 / $715 / $361

**COURSES FOR INDUSTRY AND EXHIBITORS**
- Mon SC609 Basic Optics for Non-Optics Personnel (Harding) 1:30 pm to 4:00 pm, $150 / $150 / $60

**OPTICS EDUCATORS**
- Tue WS1156 Dumpster Optics: Teaching Optics with Junk (Donnelly, Magnani) 10:30 am to 12:30 pm, $10 / $15 / $10
- Tue WS1201 I SEE THE LIGHT! An introduction to basic properties of light (McKee) 1:30 pm to 5:30 pm, $10 / $15 / $10

**PROFESSIONAL DEVELOPMENT**
- Sun WS897 Making the most of your Presentation (Doumont) 1:30 pm to 5:30 pm, Free to attendees
- Mon WS908 Structuring your Research Paper (Doumont) 8:30 am to 12:30 pm, Free to attendees
- Mon WS1202 Conveying Messages with Graphs (Doumont) 1:30 pm to 5:30 pm, Free to attendees
- Wed WS1059 Resume to Interviews: Strategies for a Successful Job Search (Welch, Krinsky) 3:30 pm to 5:30 pm, Free to attendees

Prices: SPIE Member / Nonmeber / Student
### COURSES

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<thead>
<tr>
<th>SUNDAY</th>
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<th>TUESDAY</th>
<th>WEDNESDAY</th>
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#### Advanced Metrology

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Time</th>
<th>Location</th>
<th>Fee</th>
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</thead>
<tbody>
<tr>
<td>SC213</td>
<td>Introduction to Interferometric Optical Testing (Wyant)</td>
<td>8:30 am to</td>
<td>$410 / $465 / $261</td>
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<tr>
<td>SC1164</td>
<td>Wavefront Data Analysis (Mahajan)</td>
<td>1:30 pm to  5:30 pm, $450 / $505 / $277</td>
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<tr>
<td>SC1003</td>
<td>Optical Scatter Metrology for Industry (Stover)</td>
<td>8:30 am to 12:30 pm, $445 / $500 / $275</td>
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<tr>
<td>SC492</td>
<td>Predicting, Modeling, and Interpreting Light Scattered by Surfaces (Germer)</td>
<td>1:30 pm to  5:30 pm, $375 / $430 / $247</td>
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#### Astronomical Optics and Instrumentation

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<tr>
<td>SC1114</td>
<td>The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck)</td>
<td>1:30 pm to  5:30 pm, $420 / $475 / $265</td>
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<tr>
<td>SC1086</td>
<td>Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroote Nelson)</td>
<td>8:30 am to 12:30 pm, $375 / $430 / $247</td>
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#### Atmospheric and Space Optical Systems

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#### Detectors and Imaging

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</thead>
<tbody>
<tr>
<td>SC1222</td>
<td>Learning and its Applications in Image Processing (Nasrabadi)</td>
<td>8:30 am to  5:30 pm, $600 / $715 / $361</td>
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<tr>
<td>SC504</td>
<td>Introduction to CCD and CMOS Imaging Sensors and Applications (Janesick)</td>
<td>8:30 am to  5:30 pm, $740 / $855 / $417</td>
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<tr>
<td>SC916</td>
<td>Digital Camera and Sensor Evaluation Using Photon Transfer (Janesick)</td>
<td>8:30 am to 12:30 pm, $655 / $770 / $383</td>
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<tr>
<td>SC194</td>
<td>Multispectral and Hyperspectral Image Sensors (Lomheim)</td>
<td>1:30 pm to  5:30 pm, $455 / $510 / $279</td>
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#### Nanoscience

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<tbody>
<tr>
<td>SC1223</td>
<td>A Crash Course on Spin Physics (Dyakonov)</td>
<td>8:30 am to 12:30 pm, $375 / $430 / $247</td>
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#### Optical Design and Systems Engineering

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>SC690</td>
<td>Optical System Design: Layout Principles and Practice (Greivenkamp)</td>
<td>8:30 am to  5:30 pm, $635 / $750 / $375</td>
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<tr>
<td>SC1112</td>
<td>Introduction to Electro-Optical Systems Design (Stotts)</td>
<td>8:30 am to 12:30 pm, $710 / $825 / $405</td>
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<tr>
<td>SC011</td>
<td>Design of Efficient Illumination Systems (Cassarly)</td>
<td>8:30 am to 12:30 pm, $375 / $430 / $247</td>
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<tr>
<td>SC912</td>
<td>Intermediate Lens Design (Bentley)</td>
<td>8:30 am to 12:30 pm, $635 / $750 / $375</td>
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<tr>
<td>SC1086</td>
<td>Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroote Nelson)</td>
<td>8:30 am to 12:30 pm, $375 / $430 / $247</td>
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<tr>
<td>SC1165</td>
<td>Probability for Systems Engineers (Arenberg)</td>
<td>8:30 am to 12:30 pm, $375 / $430 / $247</td>
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<tr>
<td>SC003</td>
<td>Practical Optical System Design (Youngworth)</td>
<td>8:30 am to 12:30 pm, $705 / $820 / $403</td>
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<tr>
<td>SC1178</td>
<td>Fundamentals of Molded Optics (Symmons, Schaub)</td>
<td>8:30 am to 12:30 pm, $410 / $465 / $261</td>
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<td>SC1086</td>
<td>Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroote Nelson)</td>
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<tr>
<td>SC1199</td>
<td>Stray Light Analysis and Control (Fest)</td>
<td>8:30 am to 12:30 pm, $760 / $379</td>
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<tr>
<td>SC683</td>
<td>Introduction to Modern Optical Drawings – the ISO 10110 Standard (Aikens)</td>
<td>8:30 am to 12:30 pm, $375 / $430 / $247</td>
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<tr>
<td>SC1114</td>
<td>The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck)</td>
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For more information, visit [SPIE Optics + Photonics 2017](www.spie.org/op) or email help@spie.org.
## Optical Systems & Lens Design

<table>
<thead>
<tr>
<th>SUNDAY</th>
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<td>SC1179 Optical Glass – Properties and Application-oriented Specification (Hartmann) 8:30 am to 5:30 pm, $645 / $760 / $379</td>
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<td>SC1019 Mounting of Optical Components (Kasunic) 8:30 am to 5:30 pm, $680 / $795 / $393</td>
<td>SC1015 Fastening Optical Elements with Adhesives (Daly) 1:30 pm to 5:30 pm, $375 / $430 / $247</td>
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</table>

## Optomechanics and Optical Manufacturing

| SC213 Introduction to Interferometric Optical Testing (Wyant) 8:30 am to 12:30 pm, $410 / $465 / $261 | SC781 Optomechanical Analysis (Hatney) 8:30 am to 5:30 pm, $645 / $760 / $379 | SC1086 Optical Materials, Fabrication and Testing for the Optical Engineer (DeGroote Nelson) 8:30 am to 12:30 pm, $375 / $430 / $247 | SC1120 Finite Element Analysis of Optics (Doyle, Genberg) 8:30 am to 5:30 pm, $670 / $785 / $389 |  |
| SC014 Introduction to Optomechanical Design (Vukobratovich) 8:30 am to 5:30 pm, $1,075 / $1,330 / $607 | SC010 Introduction to Optical Alignment Techniques (Castle) 8:30 am to 5:30 pm, $600 / $715 / $361 | SC1018 Advanced Composite Materials for Optomechanical Systems (Zweber) 8:30 am to 5:30 pm, $600 / $715 / $361 | SC1085 Optomechanical Systems Engineering (Kasunic) 8:30 am to 5:30 pm, $670 / $785 / $389 |  |
| SC1114 The Proper Care of Optics: Cleaning, Handling, Storage and Shipping (Schalck) 1:30 pm to 5:30 pm, $420 / $475 / $265 | SC015 Fastening Optical Elements with Adhesives (Daly) 1:30 pm to 5:30 pm, $375 / $430 / $247 |  |  |  |

## Remote Sensing

| SC567 Introduction to Optical Remote Sensing Systems (Shaw) 1:30 pm to 5:30 pm, $375 / $430 / $247 | SC1220 Imaging Spectrometry (Hagen) 8:30 am to 12:30 pm, $375 / $430 / $247 | SC152 Infrared Focal Plane Arrays (Hubbs) 8:30 am to 5:30 pm, $600 / $715 / $361 |  |  |

## Courses for Industry and Exhibitors

| SC609 Basic Optics for Non-Optics Personnel (Harding) 1:30 pm to 4:00 pm, $150 / $150 / $60 | SC1156 Dumpster Optics: Teaching Optics with Junk (Donnelly, Magnani) 10:30 am to 12:30 pm, $10 / $15 / $10 |  |  |  |

## Optics Educators

| WS1156 Dumpster Optics: Teaching Optics with Junk (Donnelly, Magnani) 10:30 am to 12:30 pm, $10 / $15 / $10 | WS1201 I SEE THE LIGHT! An introduction to basic properties of light (McKee) 1:30 pm to 5:30 pm, $10 / $15 / $10 |  |  |  |

## Professional Development

| WS897 Making the most of your Presentation (Dumont) 1:30 pm to 5:30 pm, Free to attendees. | WS908 Structuring your Research Paper (Dumont) 8:30 am to 12:30 pm, Free to attendees. | WS1059 Resumes to Interviews: Strategies for a Successful Job Search (Welch, Krinsky) 3:30 to 5:30 pm, Free to attendees. |  |  |
| WS1202 Conveying Messages with Graphs (Dumont) 1:30 pm to 5:30 pm, Free to attendees. |  |  |  |  |

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Get ready for the eclipse!

Pick up your eclipse poster and viewing glasses at these events:
- Welcome Reception
- SPIE Member Reception
- Student Leadership Workshop
- SPIE Career Center Booth 657

Photodetectors: Theory, Practice, Applications, and Selection
Tuesday 8 August 2017 · 8:00 AM to 9:45 AM
Location: Marriott Marquis, Palomar

Photodetectors are essential components in a vast array of modern scientific and commercial instruments and devices; technological progress will make them even more ubiquitous. Understanding their opto-electronic properties, regimes of operation, circuit requirements, and noise characteristics is essential to a practitioner to make a proper photodetector selection for a given application.

The purpose of this presentation is to provide guidance in this process by discussing the above considerations for the four most common point photodetectors: photomultiplier tube, photodiode, avalanche photodiode, and silicon photomultiplier.

Target Audience
The talk is open to anyone who uses low light level photodetectors or is involved with design of any system using photo detectors.

Instructor
Slawomir Piatek, Hamamatsu

Sponsored by

Raman Spectroscopy: Theory and Practice
Tuesday 8 August 2017 · 10:15 AM to 12:00 PM
Location: Marriott Marquis, Palomar

Information about the system under investigation may be contained in the spectrum of light received from it. Spectroscopy is an umbrella term referring to a multitude of measurement techniques that can be employed to access the information.

This presentation mentions several major dispersive and non-dispersive spectroscopic techniques such as, for example, fluorescence, Fourier transform, laser-induced breakdown, time-resolved, and discusses in greater detail three forms of Raman spectroscopy: normal, resonant, and surface enhanced. The discussion of Raman spectroscopy includes the theory behind the technique, the hardware components of a working setup, and the most common applications.

Target Audience
The talk is open to anyone who would like to learn about theoretical and practical aspects of spectroscopy, in particular, dispersive Raman spectroscopy.

Instructor
Slawomir Piatek, Hamamatsu

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Student Chapter Poster Exhibit
Tuesday 8 August 2017 · 10:00 AM to 5:00 PM
Location: Conv. Ctr. Hall B1
Discover the research of some of the brightest SPIE student groups and the programs they have developed to increase optics awareness and literacy in their regions.

Annual General Meeting of the SPIE Corporation
Tuesday 8 August 2017 · 6:00 PM to 7:00 PM
Location: Marriott Marquis, Marina E
San Diego Marriott Hotel and Marina
The Society of Photo-Optical Instrumentation Engineers (SPIE)
Agenda:
- 2017 Election Results
- Report on the “State of the Society”
- Treasurer’s Report
- 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 2017 election will be announced and the President and CEO will report on the “State of the Society.” This meeting will be followed by the Members Reception. Both events are open to members only. Members will receive an email with instructions on how to live stream the AGM. Questions are encouraged.

Diversity and Inclusion Breakfast Reception
Thursday 10 August · 8:30 AM to 10:00 AM
Location: Marriott Marquis, Mission Hills
Join us at the end of the week to relax and learn. This networking event is a great time to connect and build relationships with others interested promoting diversity and inclusion. Light breakfast will be served. All are welcome.
GENERAL INFORMATION

REGISTRATION

EXHIBITION HOURS
Tuesday 8 August · 10:00 am to 5:00 pm
Wednesday 9 August · 10:00 am to 5:00 pm
Thursday 10 August · 10:00 am to 2:00 pm

ONSITE REGISTRATION AND BADGE PICK-UP HOURS
Marriott Marquis, Marina Foyer (Level 3)

STUDENT REGISTRATION
Saturday 5 August · 7:30 am to 10:00 am

GENERAL CONFERENCE REGISTRATION
Saturday 5 August · 10:00 am to 5:00 pm

CONFERENCE AND EXHIBITION REGISTRATION
Conv. Ctr., Hall A/B
Sunday 6 August · 7:00 am to 5:00 pm
Monday 7 August · 7:30 am to 5:00 pm
Tuesday 8 August · 7:30 am to 5:00 pm
Wednesday 9 August · 7:30 am to 5:00 pm
Thursday 10 August · 7:45 am to 4:00 pm

Press Registration
For credentialed press and media representatives only. Please email contact information, title, and organization to media@spie.org.

FOOD AND BEVERAGE SERVICES

Coffee Breaks
Sunday · Upper Level Lobbies, and Mezzanine Lobby
Monday · Upper Level Lobbies, and Mezzanine Lobby
Tuesday · Exhibition Hall A
Wednesday · Exhibition Hall A
Thursday morning · Exhibition Hall A
Thursday afternoon · Upper Level Lobbies and Mezzanine Lobby

Complimentary coffee will be served twice daily at 10:00 am and 3:00 pm. Check individual conference listings for exact times and locations.

Food & Refreshments for Purchase
Hot and cold snacks, hot entrees, deli sandwiches, salads, and pastries are available for purchase. Cash and credit cards accepted.

STARBUCKS
Convention Center, Lobby B
Sunday & Monday · 7:00 am to 3:00 pm
Tuesday & Wednesday · 7:00 am to 4:00 pm
Thursday · 7:00 am to Noon

MRS. FIELD’S COOKIES / AUNTIE ANNE’S PRETZELS
Convention Center, Upper Lobby 6A
Sunday through Thursday · 7:30 am to 4:00 pm

Concessions
Exhibition Hall B
Tuesday and Wednesday · 11:00 am to 2:00 pm

Assorted Gourmet Salads and Sandwiches, Fruit, Chips, Snacks and Beverages are available for purchase. Cash and credit cards accepted.

Beer & Pretzel Closing Celebration
Exhibition Hall A/B1
Thursday · 12:00 pm to 1:30 pm

Join exhibitors and colleagues for beer and pretzels to celebrate the closing of the event. A raffle and prize drawing are also offered. Open to all paid attendees.
ONSITE SERVICES

Internet Access
Complimentary wireless access is available; 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
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 Press Room
Conv. Ctr. Hall A/B, Registration Area
Open during Registration hours
For Registered Press only. The Press Room provides meeting space, refreshments, access to exhibitor press releases, and Internet connections. Press are urged to register before the meeting by emailing name, contact information, and name of publication to media@spie.org. Preregistration closes approximately 10 days before the start of the event.

SPIE Luggage & Coat Check
Conv. Ctr. Hall B Lobby (Ground Level)
Sunday through Wednesday · 7:30 am to 6:00 pm
Thursday · 8:00 am to 6:00 pm
Complimentary luggage, package, and coat storage are available. Please note hours; no late pickup available.

Business Center
Conv. Ctr., Hall D Lobby (Ground Level)
Monday through Thursday · 8:00 am to 6:00 pm
Services include photocopying, faxing, printing services, and shipping. Office supplies are also available. Phone 619.525.5450

Restaurant & City Information
Conv. Ctr. Hall B Lobby
Sunday through Thursday · 9:00 am to 6:00 pm
Services include sightseeing, shopping, and restaurant information

Lost and Found
Cashier, Convention Center, Hall B1
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: 619.525.5407
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 and Misconduct Policy
SPIE is a professional, not-for-profit society committed to providing valuable and safe conference and exhibition experiences. SPIE is dedicated to equal opportunity and treatment for all its members, meeting attendees, staff, and contractors. Attendees are expected to be respectful to other attendees, SPIE staff, and contractors. Harassment and other misconduct will not be tolerated; violations will be addressed promptly and seriously. Consequences up to and including expulsion from the event as appropriate may be implemented immediately.

The SPIE anti-harassment policy can be found at http://spie.org/policy

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.

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.
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.

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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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