



SPIE®

# 2014 Advanced Lithography

**Exhibition Guide**  
[www.spie.org/al](http://www.spie.org/al)

Moving Technology to Market™

**Exhibition**  
25–26 February 2014

**Conference & Courses**  
23–27 February 2014

**Location**  
San Jose Convention Center  
San Jose, California, USA



# Super-fast Lithography Verification Through Process Window

**N**anoORC is a production-proven super-fast lithography verification tool capable of full-chip verification through process window. Its GPU-based system achieves **10X speed up** in verification over traditional CPU based system. Its model accuracy had been verified by its customer between 130nm and 28nm nodes. It can check the typical errors such as bridging, approaching, broken, pinching, line-end shortening, CD deviation, EPE, sidelobe, image-missing, nils and meef. It can be run on either CPU cluster or GPU cluster.

## Assured Accuracy

- Theoretical results match PROLITH
- Calibrated model verified by Customers
- Verification done between 130nm and 28 nm nodes
- Calibration process requires no expertise in resist modeling.

## Super-fast Speed

- Explores the massive parallelism in GPU
- Achieves **10x in speed vs traditional CPU tools**
- Off-the-shelf NVIDIA GPU are used
- GPU adds only 25% to total hardware cost
- Traditional CPU cluster upgradable to GPU cluster

## Process-window Awareness

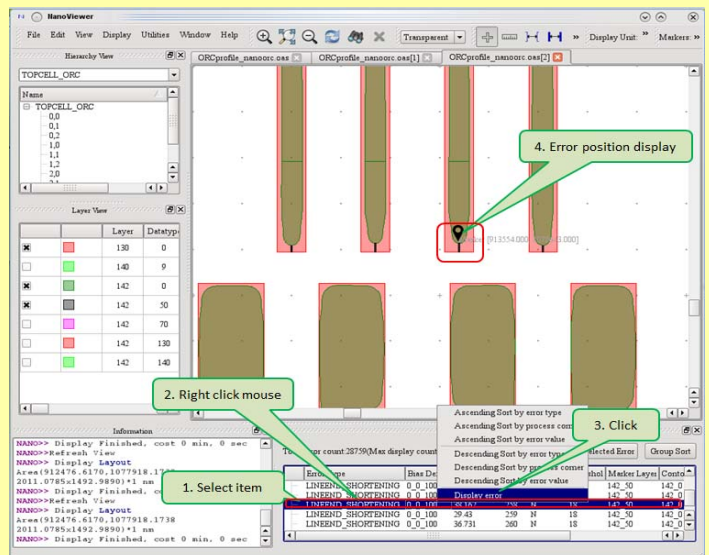
- Verification at each of multiple process corners
- Probe error for process corner and layout location
- Verification on Process-Variation-Band (PVB)
- Computes process window for multiple cutlines on a layout

## Convenient Error Analysis

- Verification results filtered to retain only the worst errors
- Results grouped by process corner, by error type and sorted by error value
- Cross-probing between reported error and layout
- Statistical results such as histogram available

## Simple Calibration

- No need to be a resist model expert



- No setting of unfamiliar parameters
- Just specify evaluation criteria and model form
- Rest done by the software automatically

## Strong Utility Tools

### NanoViewer:

- high-capacity, high-speed layout viewer
- Speed is faster than some popular commercial viewer
- View layout with or without verification results

### NanoProcWin:

- High speed common process window calculator
- Any layout with any number of cutlines
- Optical model or calibrated model
- GPU boosts speed

## Easy Deployment

- Multi-core workstation with or without GPU
- Group of networked computers or
- Computer cluster for distributed computation
- On widely used Linux operating system

## Low Cost of Ownership

- CPU version cost competitive on absolute term
- GPU version cost competitive relative to performance
- GPU hardware adds only 25% to total hardware cost



# Welcome

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**SPIE**  
Advanced Lithography



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Promotional Partners

**MEMs and Nanotechnology Exchange**

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**Solid State Technology**

*SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, program committees, and session chairs who have so generously given their time and advice to make this symposium possible.*

*The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members. This program is based on commitments received up to the time of publication and is subject to change without notice.*

For information about exhibiting, sponsorship, and advertising opportunities at future Advanced Lithography events, contact: SPIE Sales at [spiesales@spie.org](mailto:spiesales@spie.org)

Advanced Etch Technology for Nanopatterning III Conference



www.lamresearch.com

Advances in Patterning Materials and Processes XXXI Conference



www.tokamerica.com

Attendee Lunch



www.dow.com

Banner  
HITACHI  
Inspire the Next  
www.hitachi-hta.com



www.nikonprecision.com

Breakfast



www.kla-tencor.com

Coffee Breaks



www.asml.com



www.nuflare.com



www.kla-tencor.com

Conference Bags



www.zeiss.com/sms

Conference Bag Pens



www.nikonprecision.com

Design-Process-Technology  
Co-optimization for  
Manufacturability VIII Conference



www.hitachi-hta.com

Exhibition Bags



www.synopsys.com

Extreme Ultraviolet Lithography (EUV) V  
Conference



www.rigaku.com

Featured Exhibitor



www.tokamerica.com



www.trioptics.com

Hotel Room Key



www.cymer.com

Internet Pavilion



www.jeolusa.com

Lanyards



www.mentor.com

Logo - Online Floor Plan



www.zeiss.com/sms



www.tokamerica.com



www.trioptics.com

Meter Board



www.cadencedesign.com



www.nikonprecision.com

Metrology, Inspection, and Process  
Control for Microlithography XXVIII  
Conference



www.novameasuring.com

Optical Microlithography XXVII  
Conference



www.cymer.com

Panel Discussions



www.kla-tencor.com

Plenary Session



www.asml.com

Poster Reception



www.azem.com

Poster Reception Cosponsored



www.tokamerica.com

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www.tel.com

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www.hitachi-hta.com

Wi-Fi



www.tel.com

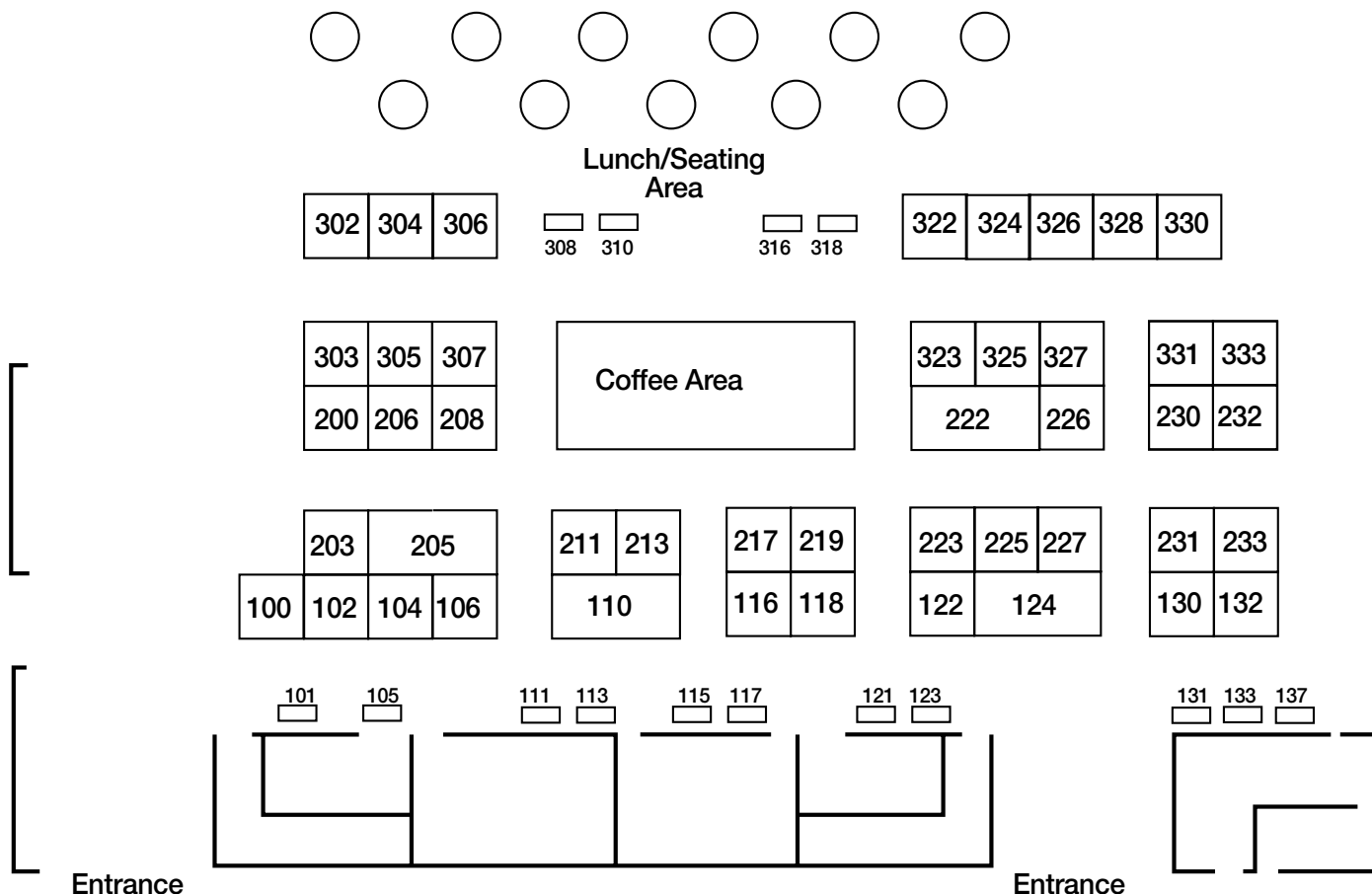
HITACHI

www.hitachi-hta.com

General Refreshments

Hitachi High Technologies America  
Micro Lithography Inc.  
Rigaku Innovative Technologies, Inc.

# San Jose Convention Center · Exhibition Floor



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# General Information

## Exhibition Hours

Tuesday ..... 10:00 am to 5:00 pm  
Wednesday ..... 10:00 am to 4:00 pm

## Onsite Registration/Badge Pick-Up Hours

San Jose Convention Center

Sunday 23 February ..... 7:00 am to 5:00 pm  
Monday 24 February ..... 7:00 am to 4:00 pm  
Tuesday 25 February ..... 7:30 am to 5:00 pm  
Wednesday 26 February ..... 7:30 am to 4:00 pm  
Thursday 27 February ..... 7:30 am to 4:00 pm

## Coffee Breaks

Served daily - 7:30 am, 10:00 am, and 3:00 pm

Check individual conference listings for exact times and locations.

Sponsored by  and 

## Breakfast Breads

Convention Center, Ballroom Concourse

Monday – Thursday, 7:30 am

Sponsored by 

## Food and Refreshments for Purchase

Exhibition Hall Concession Stand

Tuesday – Wednesday, 11:00 am to 2:00 pm


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

## SPIE-Hosted Lunches

Exhibition Hall

Tuesday – Wednesday, 11:30 am to 1:30 pm

Check individual conference listings for exact times. Complimentary tickets for these lunches will be included with full conference registrations. Exhibitors and students may purchase tickets at the Cashier Desk.

Tuesday Lunch sponsored by 

## Desserts

Exhibition Hall

Tuesday – Wednesday

Complimentary tickets for the dessert snacks will be included in conference attendee registration packets.

Sponsored by  and 

## Internet Access

**Location of Internet - Convention Center Ballroom Concourse**

Complimentary wired internet access is available; attendees can hook up their laptops or use provided workstations.

Internet Pavilion sponsored by 

**WiFi – Convention Center Upper Level Concourse**

Complimentary wireless access is available; instructions will be posted onsite.

East End WiFi sponsored by   
**TOKYO ELECTRON**

West End WiFi sponsored by   
**HITACHI**  
Inspire the Next

## SPIE Bookstore

Convention Center Lobby near Registration

The SPIE Bookstore is your source for the latest SPIE Books, Proceedings, and Education and Professional Development materials. Become an SPIE Member, explore the Digital Library, take home a free SPIE poster, or buy a souvenir (tie, t-shirt, educational toys, and more).

## Underage Persons on Exhibition Floor Policy

For safety and insurance reasons:

- No persons under the age of 18 will be allowed in the exhibition area during move-in and move-out.
- Children 14 and older, accompanied by an adult, will be allowed in the exhibition area during open exhibition hours only.
- All children younger than 14, including babies in strollers and toddlers, are not allowed in the exhibition area at any time.

## Unauthorized Solicitation Policy

Unauthorized solicitation in the Exhibition Hall is prohibited. Any non-exhibiting 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.

## Restaurant Reservations and Information Desk

The San Jose Convention and Visitors Bureau operates a Restaurant Reservations and Information Desk on the street level of the Convention Center near the main entrance. The desk will be open Sunday through Thursday during core hours of the convention. For more information visit their website <http://www.sanjose.org>



# Courses at SPIE Advanced Lithography

Relevant training | Proven instructors | Education you need to stay competitive in today's job market

- Choose from 13 courses and learn current approaches in EUV lithography, DSA, optical lithography, FEOL/MOL/BEOL lithography, and more
- SPIE Student Members receive 50% off course registration
- New courses in 2014 include Metrology Toolset Monitoring, Matching, Maintenance and Management, and Modeling and Computational Lithography Fundamentals
- Earn CEUs to fulfill continuing professional education requirements

[www.spie.org/education](http://www.spie.org/education)

SUNDAY	MONDAY	THURSDAY
SC1099 <b>Chemistry and Lithography</b> (Okoroanyanwu) 8:30 am to 5:30 pm, \$600 / \$710	SC1030 <b>Interaction of Physical Design and Lithography</b> (Yuan) 1:30 to 5:30 pm, \$375 / \$430	SC616 <b>Practical Photoresist Processing</b> (Dammel) 8:30 am to 12:30 pm, \$375 / \$430
SC1009 <b>Electron Beam Inspection - Principles and Applications in IC and Mask Manufacturing</b> (Xiao) 8:30 am to 12:30 pm, \$375 / \$430		
SC888 <b>EUV Lithography</b> (Bakshi, Ahn, Naulleau) 8:30 am to 5:30 pm, \$830 / \$940		
SC101 <b>Introduction to Microlithography: Theory, Materials, and Processing</b> (Willson, Bowden) 8:30 am to 5:30 pm, \$600 / \$710		
SC116 <b>Lithographic Optimization: A Theoretical Approach</b> (Mack) 8:30 am to 5:30 pm, \$650 / \$760		
SC992 <b>Lithography Integration for Semiconductor FEOL &amp; BEOL Fabrication</b> (Lin, Zhang) 8:30 am to 5:30 pm, \$600 / \$710		
<b>NEW</b> SC1133 <b>Metrology Toolset Monitoring, Matching, Maintenance and Management</b> (Solecky, Adan) 8:30 am to 12:30 pm, \$375 / \$430		
<b>NEW</b> SC1132 <b>Modeling and Computational Lithography Fundamentals</b> (Lai) 8:30 am to 5:30 pm, \$600 / \$710		
SC885 <b>Principles and Practical Implementation of Multiple Patterning</b> (Dusa, Hsu) 8:30 am to 5:30 pm, \$600 / \$710		
SC1067 <b>Directed Self Assembly and its Application to Nanoscale Fabrication</b> (de Pablo, Nealey, Ruiz) 1:30 to 5:30 pm, \$375 / \$430		
SC1100 <b>Scatterometry in Profile, Overlay and Focus Process Control</b> (Cramer, Turovets) 1:30 to 5:30 pm, \$375 / \$430		

Register now  
for courses at the  
SPIE Cashier Desk.

## Money-back Guarantee

We are confident that once you experience an SPIE course for yourself you will look to us for your future education needs. However, if for any reason you are dissatisfied, we will gladly refund your money. We just ask that you tell us what you did not like; suggestions for improvement are always welcome.



## Continuing Education Units

SPIE has been approved as an authorized provider of CEUs by IACET, The International Association for Continuing Education and Training (Provider #1002091). In obtaining this approval, SPIE has demonstrated that it complies with the ANSI/IACET Standards which are widely recognized as standards of good practice.

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

# 2014 Advanced Lithography Exhibition Directory



Exhibitors are listed in alphabetical order with details about products or services each is exhibiting. Companies are additionally cross-indexed by technology areas. The address of each exhibitor is also listed, making this Exhibition Guide an excellent reference tool to take back to your office and share with your colleagues.

## aBeam Technologies, Inc. #111

22290 Foothill Blvd. Ste 2, Hayward, CA, 94541 United States  
+1 510 497 0222  
support@abeamtech.com; www.abeamtech.com

### Featured Product: myCD - model based software to automatically extract contours and CDs from SEM images

aBeam Technologies Inc. develops software to simulate and optimize micro and nano-fabrication processes: CD-metrology, e-beam lithography, and dry etch. myCD is a model based software to automatically extract contours, CDs, LER, wall angles from SEM images. CHARIOT is the world's most advanced Monte Carlo software to calibrate and optimize CD-SEM and EBL. DISPLACE is a software to correct charging placement error. Other products involve calibration chips for e-beam systems and CD-SEM. Contact: Sergey Babin, sb@abeamtech.com

## Amuneal Mfg Corp #200

4737 Darrah St, Philadelphia, PA, 19124 United States  
+1 215 535 3000; fax +1 215 743 1715  
info@amuneal.com; www.amuneal.com

### Featured Product: Magnetic Shielding Design, Fabrication and Hydrogen Annealing

Since 1965, Amuneal Mfg Corp has provided magnetic shielding solutions to industry and research. We provide magnetic shielding design, modeling, fabrication and Hydrogen annealing for prototype and full production quantities. Contact: Stuart Koch, Vice President, Technical Products, stuartk@amuneal.com; Michael Adolf, Manager, Technical Products, mikea@amuneal.com

## ASML #132

**ASML**  
SPIE Corporate Member  
2650 West Geronimo Place, Chandler, AZ, 85224 United States  
+1 800-227-6462  
information@asml.com; www.asml.com

ASML is the world's leading provider of lithography systems for the semiconductor industry, manufacturing complex machines that are critical to the production of integrated circuits or chips. Headquartered in Veldhoven, the Netherlands, ASML is traded on Euronext Amsterdam and NASDAQ under the symbol ASML.

## attocube systems Inc. #116

**attocube systems Inc.**  
SPIE Corporate Member  
1918 Martin Luther King Jr Way, Berkeley, CA, 94704 United States  
+1 510 649 9245  
info@attocube.com; www.attocube.com

attocube is a worldwide supplier for ultra-precision nanopositioner and multi-axes interferometric sensors. With the introduction of the Industrial Line series, attocube offers highest precision piezodriven technology with extremely rugged yet cost efficient design. attocube's patented fiber interferometer technology is being used in various applications such as extreme environmental positioning or micromachining.



## Benchmark Technologies

#122

7 Kimball Lane, Lynnfield, MA, 01940 United States  
+1 781 246 3303; fax +1 781 246 0308  
contact@benchmarktech.com; www.benchmarktech.com

### Featured Product: OmniMatch - Litho Tool Overlay Optimization and Monitoring Software

Benchmark supplies a variety of test reticles for yield enhancement, throughput improvement and process monitoring. Benchmark's Universal Matching and Phase Shift Focus Monitor reticles continue to be the industry standards. Reticles are also available for lithography tool resolution assessment, defect monitoring, exposure dose optimization and alignment mark evaluation. Benchmark also provides electrostatic measurement systems for reticles and overlay monitoring and analysis software. Contact: Andrew Zanzal, Vice President - Sales, azanzal@benchmarktech.com; Patrick Reynolds, President, preynolds@benchmarktech.com

## Berliner Glas KGaA Herbert Kubatz GmbH & Co.

#230

**SPIE** Corporate Member

Waldkraiburger Str 5, Berlin, 12347 Germany  
+49 30 60905 0; fax +49 30 60905 100  
chucks@berlinerglas.de; www.berlinerglas.com

### Featured Product: Permitting the Smallest Structures.

Berliner Glas offers the semiconductor industry ultra-fast chucking solutions for the highest yield in high-performance applications, with extremely high flatness and very low dimensional variations in parallelism. The main advantages of the chucks and clamps that are made at Berliner Glas include integrated cooling and heating as well as one or two sided clamping with customized structures to meet the performance criteria for cutting edge semiconductor applications. Contact: Kevin Liddane, Director of Sales - North America, kliddane@berlinerglas.com; Beate Baumgarten, Account Manager, baumgarten@berlinerglas.de

## Brewer Science, Inc.

#213

**SPIE** Corporate Member

2401 Brewer Dr, Rolla, MO, 65401-7003 United States  
+1 573 364 0300; fax +1 573 364 6880  
info@brewerscience.com; www.brewerscience.com

Since 1981, when its ARC® materials revolutionized lithography processes, Brewer Science has expanded its technology to include products enabling advanced lithography, thin wafer handling, 3-D integration, chemical and mechanical device protection, and products based on carbon nanotubes and nanotechnology.

## Brion Technologies

#132

4211 Burton Dr, Santa Clara, CA, 95054 United States  
+1 408 653 1500; fax +1 408 653 1501  
info@briontech.com; www.brion.com

 Meter Board Sponsor

## Cadence

#206

2655 Seely Ave, San Jose, CA, 95134-1931 United States  
+1 408 943 1234  
www.cadence.com

 Conference Bag, Online Floor Plan Sponsor

## Carl Zeiss SMS GmbH

#205

Carl Zeiss Promenade 10, Jena, 07745 Germany  
+49 3641 36 2242  
info.sms@zeiss.com; www.zeiss.com/sms

### Featured Product: New repair tool MeRiT® HR II, registration & overlay metrology system PROVE® Compact, WLCD for CD

The ZEISS strategic business unit Semiconductor Metrology Systems (SMS) specializes in a key process in semiconductor manufacturing: verifying and repairing photomasks. With core competences in light and electron optics as well as a unique femtosecond laser technology, SMS offers its clients products for assessing defects on masks, repairing critical defects, verifying the repair results and dedicated metrology solutions for photomasks. Contact: James Polcyn, Sales Manager, Jim.Polcyn@zeiss.com

## CyberOptics

#305

5900 Golden Hills Dr, Minneapolis, MN, 55416 United States  
+1 612 542 5000  
www.cyberoptics.com

## Energetiq Technology, Inc.

#310

**SPIE** Corporate Member

7 Constitution Way, Woburn, MA, 01801-1024 United States  
+1 781 939 0763; fax +1 781 939 0769  
info@energetiq.com; www.energetiq.com

Energetiq Technology, Inc. is the leading manufacturer of high-reliability, stable light sources for advanced lithography. Energetiq's EQ-10 Electrodeless Z-Pinch™ EUV Source is the market-leading source for EUV metrology and testing applications, and Energetiq's unique Laser-Driven Light Source (LDLS™) products feature broadband output from 170nm in the deep UV, through visible and into the infrared, for resist and optics testing. For more information, visit www.energetiq.com.

## Exogenesis Corporation

#328

20 Fortune Dr, Billerica, MA, 01821 United States  
+1 978 439 0120; fax +1 978 439 0220  
www.exogenesis.us

### Featured Product: Proprietary nano-scale surface modification and surface control technologies.

Exogenesis' unique non-contact beam technology promotes significant advances in producing angstrom level smoothing, removal of nano-scale asperities, pits, and contaminants, reduces or eliminates subsurface damage, and has been used to produce superior EUV mask blanks, ultra-thin carbon films and ultra-shallow surface doping. Exogenesis Corporation – www.exogenesis.us. Contact: Arthur Kurz, Chief Commercial Officer, akurz@exogenesis.us; Richard Svluca, CEO, rsvluca@exogenesis.us

# Exhibitor Directory

## GenISys GmbH

#208

Eschenstr 66, Taufkirchen Muenchen, D-82024 Germany  
+49 89 3309197 60  
info@genisys-gmbh.com; www.genisys-gmbh.com

**Featured Product: LAB All-in-One Lithography Simulation.**  
**Enable next generation products and faster development cycles**

Based in Munich, Germany, with offices in Tokyo, Japan and Santa Clara, California, GenISys develops, markets and supports flexible, high-performance software solutions for the optimization of micro and nano fabrication processes. Addressing the market for lithography and inspection, GenISys combines deep technical expertise in layout data processing, process modeling, correction and optimization with world class software engineering and a strong focus on ease of use. Contact: Roger McCay, Sales Director North America, mccay@genisys-gmbh.com; Nezhil Unal, Vice President, unal@genisys-gmbh.com

## Gudeng Precision Industrial Co., Ltd. #106

SPIE Corporate Member

9F., No. 2, Sec. 4, Zhongyang Rd, Tucheng Dist., New Taipei City, 23678 Taiwan  
+886 2 2268 9141; fax +886 2 2268 1943  
sales@gudeng.com; www.gudeng.com

**Featured Product: - Extreme Ultraviolet(EUV) Reticle POD**

- Reticle SMIF Pod (RSP 150/200)
- Mask Package

Based on "the spirit of the Manufacturing Service Industry", Gudeng is positioned as "global innovation critical material technology provider". We provide customers with our manufacturing and consulting service to solve their current and potential problems. We expect all customers to have a remarkable and unforgettable experience with Gudeng. We will continue to be "the first-choice partner with global leading semiconductor companies by offering innovative technology of critical materials." Contact: Iris Liu, Section Manager, IrisLiu@gudeng.com; Peter Chang, Sales Manager, peter.chang@gudeng.com

## Halocarbon Products

#227

SPIE Corporate Member

887 Kinderkamack Rd, River Edge, NJ, 07661 United States  
+1 201 262 8899; fax +1 201 262 0019  
info@halocarbon.com; www.halocarbon.com

**Featured Product: Hexafluoroacetone Derivatives**

For over 60 years, Halocarbon has focused solely on fluorochemistry. Halocarbon manufactures aliphatic fluorochemicals and other specialty fluorochemicals.

## Ibss Group, Inc.

#316

SPIE Corporate Member

1559B Sloat Blvd Ste 270, San Francisco, CA, 94132-1222 United States

+1 415 566 5774; fax +1 415 566 9779  
admin@ibss.com; www.ibssgroup.com

**Featured Product: GV10x Asher is a unique source that produces high power and low pressure plasma operation.**

In 2007 ibss Group began cooperating with an inventor of a unique, patented IC plasma source. In that time ibss developed and produced the GV10x, next generation in situ downstream asher. Competitively priced the GV10x Downstream Asher reduces carbon & hydrocarbon [HC] contamination 10 to 20 times more effectively than traditional methods at vacuum pressure safe for TMP operation. Contact: Elena Grankina, office manager, elena.grankina@ibssgroup.com; Vincent Carlino, president, vince.carlino@ibssgroup.com

## Inko Industrial Corp.

#308

695 Vaqueros Ave, Sunnyvale, CA, 94085 United States  
+1 408 830 1040; fax +1 408 830 1058  
ye@pellicle-inko.com; www.pellicle-inko.com

**Featured Product: Pellicle**

INKO, a U.S. based company, manufactures a complete line of pellicles for applications ranging from ASIC production to high volume memory production. From 248nm / 193 nm DUV lithography to I/G line lithography, we have the right pellicles for your needs. Contact: Joe Mac, customer service manager, joemac@pellicle-inko.com; Feng Ye, technical support, ye@pellicle-inko.com

## Integrated Micro Materials

#232

8141 Gateway Dr Ste 240, Argyle, TX, 76226 United States  
+1 940 228 2219; fax +1 940 228 2234  
sales@imicromaterials.com; www.imicromaterials.com

## Irresistible Materials Ltd.

#318

SA1 Swansea Waterfront, Langdon House, Langdon Rd, Swansea Wales, SA1 8QY United Kingdom  
+44 7766 332237  
www.irresistiblematerials.com

## J.A. Woollam Co., Inc.

#326

645 M St Ste 102, Lincoln, NE, 68508-2243 United States  
+1 402 477 7501; fax +1 402 477 8214  
sales@jwoollam.com; www.jwoollam.com

**Featured Product: Spectroscopic Ellipsometers**

The J.A. Woollam Company offers a wide range of spectroscopic ellipsometers for nondestructive materials characterization, including thin film thickness (single and multilayer), optical constants, composition, growth/etch rates, and more. Instruments available for research and manufacturing metrology covering spectral ranges from vacuum ultra-violet to far infrared. Offering table-top, in-line, and in-situ models.

# WHERE THE FUTURE OF PHOTONICS IS FOUND



Photonics Online is the leading online community and industry resource for optics and photonics professionals.

Register for our free e-newsletter at [www.photonicsonline.com](http://www.photonicsonline.com).

Visit Advanced Lithography exhibit space 113 for a free copy of our *Photronics West 2014 Product Showcase*.



Please check out our sister site **Semiconductor Online** and register for the free weekly e-newsletter at [www.semiconductoronline.com](http://www.semiconductoronline.com).



## Photonics Online

2591 Wexford Bayne, Rd.  
Building 2, Suite 305  
Sewickley, PA 15143  
PH: (215) 675-1800 ext. 123  
[info@photonicsonline.com](mailto:info@photonicsonline.com)

# Exhibitor Directory

## JSR Micro, Inc.

#124

SPIE Corporate Member

1280 N. Mathilda Ave., Sunnyvale, CA, 94089 United States  
+1 408 543 8800; fax +1 408 543 8996  
sales@jsrmicro.com; www.jsrmicro.com

**Featured Product: Leading-edge photoresists, developers, packaging materials and specialty chemicals.**

JSR Micro, Inc. manufactures the industry's most innovative family of photoresists, developers, and specialty chemicals for trilayer, immersion materials, and chemical shrink, from the company that perfected the art of customer collaboration. JSR is also a leader in materials for packaging. Our unique THB series of negative tone resists and WPR series of dielectric materials are ideal for next generation WL-CSP (wafer level chip scale packaging) technologies that facilitate higher performance. Contact: JSR Micro, Inc., sales@jsrmicro.com

 *Promotional Partner*

## MEMS & Nanotechnology Exchange #131

1895 Preston White Dr Ste 100, Reston, VA, 20191 United States  
+1 703 262 5368; fax +1 703 262 5367  
cshort@mems-exchange.org; www.mems-exchange.org

**Featured Product: MEMS and Nanotechnology device design and fabrication services.**

The MEMS and Nanotechnology Exchange (MNX) has been providing design and fabrication services for nearly 15 years. Our team of PhD-level MEMS engineers offers a complete range of technical expertise to assist our customers at any project phase, including device design, prototype fabrication, low-volume manufacturing, and transition to high-volume production. Contact: Christy Short, Business Manager, cshort@mems-exchange.org

## Mentor Graphics

#102

SPIE Corporate Member

8005 SW Boeckman Rd, Wilsonville, OR, 97070-7777 United States  
+1 503 685 7000  
www.mentor.com

## MGN International, Inc.

#233

41984 Rio Nedo Ste 200, Temecula, CA, 92590 United States  
+1 951 719 2910; fax +1 951 719 2920  
info@mgninternational.com; www.mgnintl.com

 *General Refreshment Sponsor*

## Micro Lithography, Inc.

#211

1257 Elko Drive, Sunnyvale, CA, 94089 United States  
+1 408 747 1769; fax +1 408 747 1978  
www.mliusa.com

**Featured Product: Pellicles**

MLI is featuring pellicles formulated to yield high rates of transmission and long lifetimes for UV exposure. Our complete line of pellicle films ranges from broadband, g-/i-line to DUV (KrF-248nm and ArF-193nm). MLI's DUV pellicles have the lowest outgassing materials available in the market today. Contact: Kevin Duong, Customer Service Manager, kevin.duong@mliusa.com; Diana Tjin, Sales Administrative Manager, diana.tjin@mliusa.com

## micro resist technology GmbH

#322

Köpenicker Str. 325, Berlin, 12555 Germany  
+ 49 30 64 16 70 100; fax + 49 30 64 16 70 200  
mrt@microresist.de; www.microresist.de

**Featured Product: DUV- & E-beam resists, Polymers for NIL, Photoresists & special Photopolymers, Hybrid Polymers**

The micro resist technology GmbH develops, produces & sales photoresists & special polymers: DUV- & E-beam resists, Polymers for NIL, Photoresists & Photopolymers for UV-, Laser- & X-ray lithographie, and Hybrid Polymers for optical applications. Furthermore, technical services are offered starting from structuring of customer's substrates to the introduction of MRT products at the production on-site. Contact: Arne Schleunitz, Technical Management, a.schleunitz@microresist.de

## MicroChem Corp.

#323

90 Oak St., PO Box 426, Newton, MA, 02464 United States  
+1 617 965 5511; fax +1 617 831 2354  
sales@microchem.com

MicroChem Corp, a leading manufacturer of electronic materials, focuses on providing chemicals solutions to the MEMS and microelectronic markets, specializing in photoimagable epoxy resists, such as our SU-8 products, widely used in permanent structural applications including the fabrication of microfluidic, sensor, optical and display devices. Our PMGI resists are used in high yield, thick metal lift-off processes, as well as a sacrificial layer in air bridge and other 3-D fabrication processes. Contact: Janice Collins, jcollins@microchem.com

## Mitsui Chemicals America, Inc. #101

2099 Gateway Pl Ste 300, San Jose, CA, 95110-1017 United States  
+1 408 487 2891; fax +1 408 453 0684  
www.mitsuichemicals.com

### Featured Product: Mask Pellicle

Since 1986, Mitsui has been the industry leader in providing pellicles to the semiconductor industry. Mitsui's ISO 9001 certified full automated plant produces Mitsui Pellicle, which transmits more than 99% of exposed light with excellent uniformity and longevity. Mitsui Pellicle, manufactured by rigorous selection of all materials and with more than 20 years accumulated expertise of non-dust structure, contributes to maximum production yields by eliminating pellicle related particle generations Contact: Hiromi Tsuboi, Sales Manager, h.tsuboi@mitsuichem.com; Masanari Kitajima, General Manager, m.kitajima@mitsuichem.com

### Coffee Break Sponsor

## NuFlare Technology, Inc. #327

8-1 Shin-Sugita-Cho, Isogo-Ku, Yokohama-shi Kanagawa-ken, 235-0032 Japan  
www.nuflare.co.jp

## Opto Diode Corp. #217

**SPIE** Corporate Member

750 Mitchell Rd, Newbury Park, CA, 91320-2213 United States  
+1 805 499 0335; fax +1 805 499 8108  
sales@optodiode.com; www.optodiode.com

### Featured Product: Semiconductor devices that detect photons in the UV range, Deep UV and X-rays range.

ITW/Opto Diode-IRD delivers high-performance, standard and custom photo detectors, and reliable, high quality, standard and custom infrared and visible LEDs. The company, with the recent acquisition of International Radiation Detectors, also designs and manufactures semiconductor radiation devices that detect photons in the UV range, X-rays, and other high energy particles. Contact: Stan Duda, National Sales Manager, sduda@optodiode.com; Dejan Jovanovic, Product/Application Engineer, djovanovic@optodiode.com

## Owens Design, Inc. #225

47427 Fremont Blvd, Fremont, CA, 94538-6504 United States  
+1 510 659 1800; fax +1 510 659 1896  
sales@owensdesign.com; www.owensdesign.com

### Featured Product: Equipment Design and Build Services

Owens Design is an innovative and reliable design and manufacturing services company that specializes in providing complex capital equipment to companies in the advanced technology industries. We work with both original equipment manufacturers (OEMs) and factory end users to develop capital equipment through collaborative partnership. Owens Design provides complete turnkey capital equipment systems, subsystem modules and major equipment subassemblies. Contact: Lauren Ravenscroft, National Sales Manager, lravenscroft@owensdesign.com; Mark Danna, VP Sales and Marketing, mdanna@owensdesign.com

## Pall Corporation #231

25 Harbor Park Drive, Port Washington, NY, 11050 United States  
+1 516 484 5400  
microelectronics@pall.com; www.pall.com

### Featured Product: The Xpress EZD filter offers guaranteed low metal, particle and organics contributions

Pall will introduce the Xpress EZD filter designed for the most advanced patterning applications. The new Xpress™ EZD filter represents one of the cleanest pou lithography filters available.

Pall offers a complete line of filtration, purification and separation technologies for liquids and gases used in lithography applications. Pall has demonstrated that these innovative technologies can significantly reduce defectivity. Find out how Pall can help you improve your lithography process. Contact: Michael Mesawich, VP Marketing, michael\_mesawich@pall.com

### Promotional Partner

## Photonics Media #325

**SPIE** Corporate Member

100 West St 2nd Floor, Pittsfield, MA, 01202 United States  
+1 413 499 0514; fax +1 413 442 3180  
photonics@laurin.com; www.photonics.com

### Featured Product: Our newest publication, Industrial Photonics - A global resource on photonics in production.

We have a lot to celebrate this year; Our Photonics Buyers' Guide is 60 years old, our website has a fresh new design, and we introduce our newest publication, Industrial Photonics. Come to booth 325 to subscribe to one our industry leading publications. Photonics Media - the Pulse of the Industry. Contact: Karen Newman, Group Publisher, karen.newman@photonics.com; Ken Tyburski, Director of Sales, ken.tyburski@photonics.com

### Promotional Partner

## Photonics Online #117

2591 Wexford-Bayne Rd Ste 305, Bldg II, Sewickley, PA, 15143-8676 United States  
+1 724 940 7555; fax +1 724 940 7707  
info@photonicsonline.com; www.photonicsonline.com

### Featured Product: Sign up for our FREE E-Newsletters at www.photonicsonline.com and www.semiconductoronline.com.

Photonics Online -- Where the Future of Photonics is Found -- is the leading online community and industry resource for optics and photonics professionals. Launched October 1, 1997, Photonics Online serves the needs of design and optical engineers, researchers, scientists, and business executives in markets such as medical imaging, R&D, military/defense, commercial applications, and many others. Our engaging content includes white papers, technical articles, product updates, and breaking news. Contact: Geoffrey Tecza, Director of Sales & Publisher, gtecza@photonicsonline.com; Josh Butia, Web Content Specialist, jbutia@photonicsonline.com

# Exhibitor Directory

## PI (Physik Instrumente)

#123

**SPIE** Corporate Member

16 Albert St, Piezo, Micro & Nanopositioning Products, Auburn, MA, 01501 United States

+1 508 832 3456; fax +1 508 832 0506

info@pi-usa.us; www.pi.ws

### Featured Product: Ultra-Precision Mag-Lev Driven 6-Axis Positioning System

PI and PI miCos are leaders in sub-nanometer precision motion control and piezo ceramic nanopositioning stages, Products for OEM & research. ISO 9001, ITAR compliant, US custom design.

PRODUCTS: Non-Magnetic Positioners, UHV / EUV Compatible Positioners, Piezo Stages, Microscope Stages; Nanopositioning Systems; Hexapod 6-Axis Alignment Systems, Piezo Actuators; Non- Magnetic Motors, Servo / Stepper Motorized Stages, Digital Motion Controllers. 40 Years Experience. Contact: Jim Gareau, VP Sales, jimg@pi-usa.us; Stefan Vorndran, VP Marketing, marcom1@pi-usa.us

## Pozzetta, Inc.

#223

3121 S Platte River Dr, Englewood, CO, 80110-2139 United States

+1 303 783 3172; fax +1 303 374 7342

sales@pozzetta.com; www.pozzetta.com

### Featured Product: Photomask Compacts, Reticle Pods, Wafer Carriers, Wafer Shippers,

Companies around the world trust Pozzetta to create secure environments for the handling, storage, and transport of photomasks, reticles, and wafers. Pozzetta will protect your valuable products from particles, ESD damage, outgassed components, and high costs.

## Qoniac GmbH

#100

**SPIE** Corporate Member

Fetscherstr #72, Dresden, 01307 Germany

+49 351 418 93340; fax +49 351 418 93341

info@qoniac.com

# 2014 Photomask Technology

Mask design, production, integration,  
and next-generation mask technologies

## Call for Papers

Abstracts due 24 March 2014

[www.spie.org/pm2014](http://www.spie.org/pm2014)

### Conference

16–18 September 2014

### Exhibition

16–17 September 2014

### Location

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Monterey, California, USA

### Technologies

- Mask Making
- Emerging Mask Technologies
- Mask Application
- Mask Business



## Raith America, Inc.

#331

2805 Veterans Hwy Ste 23, Ronkonkoma, NY, 11779 United States  
+1 631 738 9500; fax +1 631 738 5055  
sales@raithusa.com; www.raith.com

**Featured Product: electron beam lithography; ion beam lithography; nano lithography; nano fabrication**

Raith and Vistec Gaussian Beam Lithography combined are forming the largest organization across the globe specialized in providing innovative instrument solutions for electron and ion beam lithography, nano manipulation and electron beam induced processes. With sub 10 nm linewidth guaranteed, our electron beam lithography systems provide state of the art performance. Beyond established nano lithography capabilities, the core instruments are extended to versatile nano engineering solutions. Contact: Andre Linden, Sales Manager, al@raithusa.com.

 *Conference, General Refreshment Sponsor*

## Rigaku Innovative Technologies, Inc. #304

1900 Taylor Rd, Auburn Hills, MI, 48326-1740 United States  
+1 248 232 6400; fax +1 248 232 6500  
info@rigaku.com; www.rigaku.com

**Featured Product: MaxEuv Litho OPTICS**

RIT is at the forefront of Multilayer optic technology for EUV Lithography. Formerly Osmic Inc., RIT was the first commercial supplier of multilayer optics for X-ray Sciences. A leader in the development & supply of EUV optics, shaping the vision of EUVL for high volume manufacturing. Rigaku is a world leader in the field of small molecule & protein crystallography, X-ray spectrometry & diffraction, X-ray optics, and semiconductor metrology. Visit Booth#308 or www.rigaku.com/products/optics/euv Contact: Jim Rodriquez, VP New Business Development, jim.rodriquez@rigaku.com; Bill Bowman, NA and Asian Sales Manager, bill.bowman@rigaku.com

## SAES Pure Gas, Inc.

#104

4175 Santa Fe Rd, San Luis Obispo, CA, 93401-8115 United States  
+1 805 541 9299  
spg@saes-group.com; www.SaesPureGas.com

**Featured Product: Advanced gas purification solutions for EUV, Immersion, Dry Lithography and Metrology applications.**

SAES Pure Gas has been working for more than 15 years with leading edge OEMs and end users in the lithography and metrology field. SAES Point of Use purifiers, automatically regenerable bulk purifiers, and microcontamination inspection Service are the industry standards for optics, masks, wafers and reticle purging and protection. OEM Qualified solutions are available for CDA, H<sub>2</sub>, N<sub>2</sub>, Ar and CO<sub>2</sub>. Impurities removed include H<sub>2</sub>O, Acids, Bases, and Organics to single digit pptV levels. Contact: Steve Wallace, Customer Service, steve\_wallace@saes-group.com

## Sage Design Automation

#324

**SPIE** Corporate Member

2075 De La Cruz Blvd Ste 105, Santa Clara, CA, 95050 United States

+1 408 727 6234

info@sage-da.com; www.sage-da.com

**Featured Product: iDRM design rule compiler : Design rule development, capture, validation & automatic check**

Sage-DA makes software tools for design rule development. The iDRM design rule compiler platform ensures consistency and closure between process data, their respective DRM representation and their DRC runset implementation. iDRM enables non-programmers to quickly and accurately capture design rules and generate correct-by-construction checks and analyses for new process technologies.

## Shin-Etsu MicroSi

#130

10028 Sout 51st Street, Phoenix, AZ, 85044 United States

+1 480 893 8898; fax +1 480 893 8637

info@microsi.com; www.microsi.com

Shin-Etsu, the world's No. 1 supplier of semiconductor silicon wafers and a leading supplier of essential electronic materials. Shin-Etsu's product portfolio includes, photomask blanks, EB resists, pellicles, synthetic quartz, semiconductor advanced resists along with numerous specialized thermal interface materials. Contact: Ed Nichols, Marketing Manager, enichols@microsi.com; info@microsi.com

## SOKUDO Co. Ltd / SCREEN / DNS Electronics

#118

820 Kifer Road, Suite B, Sunnyvale, CA, 94086 United States

+1 408 523 9140; fax +1 408 523 9150

info@sokudospeed.com; www.sokudo.com

**Featured Product: DUO 300mm**

DUO 450mm

RF3S - 150mm to 300mm

80EX - 100mm to 200mm

60EX - 50mm to 150mm

SOKUDO Co., Ltd. is specialized in the research, development, manufacturing and sales of semiconductor coat/develop equipment (a SCREEN company)

BARC, SOG, SOD, I-Line, KrF, ArF, immersion, NTD, DSA, EUV etc

100mm to 200mm - 80EX system

50mm to 150mm - 60EX system

150mm to 300mm - 180wph RF3S system

300mm systems - 600wph standalone DUO system

300mm systems +400wph linked DUO system

450mm systems - support all processes Contact: Laszlo Mikulas, Vice President Sales & Product Engineering - USA, laszlo.mikulas@dnse.com; Ian Winch, Senior Product Engineer, ian.winch@dnse.com

# Exhibitor Directory

## Promotional Partner

### Solid State Technology

#105

1786 18th St, San Francisco, CA, 94107 United States  
+1 415 255 0390; fax +1 415 255 9214  
info@extensionmedia.com; electroiq.com

### Storex Technologies

#137

Calea Mosilor nr 274 ap 34, Bucharest, Bucharest, 020892 Romania  
+40 7226 90644; fax +40 2121 18478  
eugenp@rdslink.ro; www.storextechnologies.com

#### **Featured Product: Quantum Optical Lithography with 5 nm half-pitch on silicon wafer.**

www.storextechnologies.com Contact: Eugen Pavel, CEO, eugenp@rdslink.ro

### Sumika Electronic Materials

#307

3832 E Watkins St, Phoenix, AZ, 85034-7254 United States  
+1 602 659 2500; fax +1 602 438 2277  
customerservice@sumikamaterials.com;  
www.sumitomo-chem.co.jp

### SwissLitho AG

#333

 SPIE Corporate Member

Technoparkstrasse 1, Zürich, 8005 Switzerland  
+41 44 500 3800  
info@swisslitho.com; www.swisslitho.com

#### **Featured Product: NanoFrazor explore - rapid prototyping of high-quality nanostructures**

The NanoFrazor revolutionizes serial nanopatterning. High-quality nanostructures are written and inspected simultaneously. Complex 3D nanostructures can be fabricated with an unmatched vertical precision of 1 nm and a lateral resolution of 10 nm half-pitch. A scan speed of 20mm/s has been demonstrated. Wet development and vacuum is not needed for this direct write process. The entry-level model, the "NanoFrazor explore", is affordable and designed for R&D applications in nanotechnology. Contact: Felix Holzner, CEO, holzner@swisslitho.com; Philip Paul, CTO, paul@swisslitho.com

### SwissOptic AG

#230

Heinrich-Wild-Strasse, Heerbrugg, 9435 Switzerland  
+41 71 727 3074; fax +41 71 727 4686  
swissoptic@swissoptic.com; www.swissoptic.com

#### **Featured Product: complete front-end optical OEM assemblies**

As a reliable OEM partner, SwissOptic AG supplies plant manufacturers in the semiconductor industry with complete front-end optical assemblies. Customized assemblies with optics as the core technology are a critical part of the solutions we provide. This ensures our customers competitive advantages are realized. The main fields of use for these assemblies are the analysis of masks as well as structured and unstructured wafers, optimizing yield, and increasing the process reliability. Contact: Kevin Liddane, Director of Sales - North America, kliddane@berlinglasus.com; Jürgen Fandrich, Sales Manager, juergen.fandrich@swissoptic.com

## Exhibition Bag Sponsor

### Synopsys Inc.

#222

 SPIE Corporate Member

700 E Middlefield Rd, Mountain View, CA, 94043-4024 United States  
+1 650 584 5000  
info@synopsys.com; www.synopsys.com

#### **Featured Product: Proteus LRC, CATS, Sentaurus Lithography**

Synopsys provides industry-proven EDA solutions to meet the demands of today's advanced IC manufacturing processes while setting the standard in platform flexibility to enable innovative solutions for next generation technology nodes. Synopsys' comprehensive MASK Synthesis, Mask Data Preparation, TCAD and Yield Management tools provide leading edge performance, accuracy, quality, and cost of ownership for all your production and development needs. Contact: Manufacturing @synopsys.com

## Event Mobile App, Wi-Fi - East End Sponsor

### Tokyo Electron Limited

#203

2400 Grove Blvd, Austin, TX, 78741-6500 United States  
+1 512 424 1000; fax +1 512 424 1001  
Rob.Crowell@us.tel.com; www.tel.com

#### **Featured Product: CLEAN TRACK ACT8/12 and Lithius coater/developers, renowned for quality, reliability and performance**

Tokyo Electron (TEL) is a leading global supplier of innovative semiconductor and flat panel display production equipment. Product lines include coater/developers, thermal processing systems, plasma etchers, single wafer deposition systems, surface preparation systems, test systems, advanced packaging, gas cluster ion beam technology and metrology systems. Established in Japan in 1963, TEL has expanded to over 100 offices worldwide. Contact: Rob Crowell, Manager, Strategic Marketing, rob.crowell@us.tel.com; Michelle Pesez, Manager, Marketing and Communications, michelle.pesez@us.tel.com

## Conference, Featured Exhibitor, Online Floor Plan Sponsor, and Wednesday Poster Reception Co-Sponsor

### Tokyo Ohka Kogyo America, Inc. (TOK America)

#110

 SPIE Corporate Member

190 Topaz St, Milpitas, CA, 95035 United States  
+1 408 956 9901; fax +1 408 956 9995  
www.tokamerica.com

#### **Featured Product: ArF Immersion, EUV, DSA and Packaging process photo resists as well as Nano Imprint materials**

TOK America manufactures and markets ultra high-purity photo resists and auxiliary chemicals used in the fabrication of integrated circuits. TOK America is a US subsidiary of Tokyo Ohka Kogyo Co., Ltd., in Kawasaki, Japan, a world leader in the manufacture of photo resists, auxiliary liquid chemical products, and process equipment for the semiconductor circuit, semiconductor packaging, image sensor/MEMS, 3D packaging and display technology materials industries. Contact: Aaron Vickery, Sr. Manager Business Development, aaron.vickery@tokamerica.com; Trip Bakun, Account Manager Business Development, trip.bakun@tokamerica.com



 *Featured Exhibitor, Online Floor Plan Sponsor*

## TRIOPTICS GmbH

#306

**SPIE** Corporate Member

Hafenstr 35-39, Wedel, 22880 Germany  
+49 4103 18006 0; fax +49 4103 180062 0  
info@trioptics.com; www.trioptics.com

**Featured Product: OptiCentric® Max 300 UP- The Ultimate Solution for Alignment and Assembly of High Precision Optics**

## Vistec Electron Beam GmbH

#219

Ilmstrasse 4, Jena, 07743 Germany  
+49 3641 7998 0; fax +49 3641 7998 222  
electron-beam@vistec-semi.com; www.vistec-semi.com

**Featured Product: electron-beam lithography, SB254, SB3055**

Vistec Electron Beam GmbH provides leading technology solutions for advanced electron-beam lithography. Based on the Variable Shaped Beam (VSB) principle, the electron-beam lithography systems are mainly utilized for semiconductor applications and advanced research as silicon direct write, compound semiconductor, mask making as well as integrated optics and several new emerging markets. Contact: Ines Stolberg, Marketing Manager, ines.stolberg@vistec-semi.com

## XEI Scientific, Inc.

#121

**SPIE** Corporate Member

1755 East Bayshore Rd. Ste. 17, Redwood City, CA, 94063 United States  
+1 650 369 0133; fax +1 650 363 1659  
info@evactron.com; www.evactron.com

## Zygo Corporation

#226

**SPIE** Corporate Member

Laurel Brook Road, Middlefield, CT, 06455 United States  
+1 860 347 8506; fax +1 860 347 3869  
inquire@zygo.com; www.zygo.com

Zygo Corporation is a worldwide supplier of optical metrology instruments, precision optics, and electro-optical design and manufacturing services. Our precision noncontact measuring instruments and systems enable manufacturers to increase operating efficiencies and product yields by identifying and collecting quantitative data on product defects during and after the manufacturing process. ZYGO will be exhibiting their newest lines of interferometers and optical advances. Contact: David Melton, Director Sales & Support, dmelton@zygo.com; Kurt Redlitz, Director PPS, kredlitz@zygo.com

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Location:

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San Jose, California, USA

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# Product Categories

## Astronomy

Berliner Glas KGaA Herbert Kubatz GmbH & Co.  
PI (Physik Instrumente)

## Basic Research, Science

Amuneal Mfg Corp  
attocube systems Inc.  
Halocarbon Products  
micro resist technology GmbH  
Raith America, Inc.  
Rigaku Innovative Technologies, Inc.  
Tokyo Electron Limited

## Biomedical, Medical Imaging, Health Care

attocube systems Inc.  
Energetiq Technology, Inc.  
Opto Diode Corp.  
PI (Physik Instrumente)  
Raith America, Inc.  
Zygo Corporation

## Cameras and Imaging systems

Berliner Glas KGaA Herbert Kubatz GmbH & Co.  
SwissOptic AG

## Chemical and Biological Analysis

Rigaku Innovative Technologies, Inc.

## Computing Systems, Data Processing

attocube systems Inc.  
SwissLitho AG

## Consulting Services

Amuneal Mfg Corp  
MEMS & Nanotechnology Exchange  
Tokyo Electron Limited

## Defense, Security, Law Enforcement

Opto Diode Corp.

## Detectors, Sensors

Amuneal Mfg Corp  
Opto Diode Corp.

## Displays: Consumer, Information, Entertainment

SAES Pure Gas, Inc.

## Education and Training

Photonics Online

## Electronic Components

Opto Diode Corp.

## Electronic, Digital Imaging

aBeam Technologies, Inc.

## Emerging Photonics Technologies

Vistec Electron Beam GmbH

## Industrial Sensing and Measurement

attocube systems Inc.  
SwissOptic AG  
Zygo Corporation

## Laser Industry

Berliner Glas KGaA Herbert Kubatz GmbH & Co.  
SAES Pure Gas, Inc.  
SwissOptic AG

## Lasers and Systems

Energetiq Technology, Inc.  
SwissOptic AG

## LED, OLED, non-laser Light Sources

Opto Diode Corp.  
Rigaku Innovative Technologies, Inc.

## Lighting and Illumination

Rigaku Innovative Technologies, Inc.

## Lithographic Equipment

aBeam Technologies, Inc.  
Amuneal Mfg Corp  
Benchmark Technologies  
Berliner Glas KGaA Herbert Kubatz GmbH & Co.  
Carl Zeiss SMS GmbH  
Energetiq Technology, Inc.  
JSR Micro, Inc.  
Owens Design, Inc.  
Pozzetta, Inc.  
Raith America, Inc.  
Rigaku Innovative Technologies, Inc.  
Storex Technologies  
SwissLitho AG  
SwissOptic AG  
Tokyo Electron Limited  
Vistec Electron Beam GmbH  
Zygo Corporation

## Machine Vision, Factory Automation

Berliner Glas KGaA Herbert Kubatz GmbH & Co.  
Owens Design, Inc.  
SwissOptic AG

## Materials Processing, Lasers in Manufacturing

attocube systems Inc.  
Berliner Glas KGaA Herbert Kubatz GmbH & Co.  
SwissLitho AG

## Materials, Abrasives, Chemicals

Halocarbon Products  
JSR Micro, Inc.  
micro resist technology GmbH

## Microscopes

aBeam Technologies, Inc.  
attocube systems Inc.  
Carl Zeiss SMS GmbH  
Raith America, Inc.  
SwissLitho AG  
Zygo Corporation

## Microtechnology

MEMS & Nanotechnology Exchange  
micro resist technology GmbH  
Tokyo Electron Limited  
Vistec Electron Beam GmbH

## Misc consumables and equipment

Owens Design, Inc.  
Pozzetta, Inc.

## Mounts, Tables, Vibration Isolation

Berliner Glas KGaA Herbert Kubatz GmbH & Co.

## Nanotechnology products

aBeam Technologies, Inc.  
Benchmark Technologies  
MEMS & Nanotechnology Exchange  
micro resist technology GmbH  
Tokyo Electron Limited

## Optical Coatings, Thin Films

J.A. Woollam Co., Inc.  
MEMS & Nanotechnology Exchange  
micro resist technology GmbH  
Rigaku Innovative Technologies, Inc.  
SwissOptic AG  
Tokyo Electron Limited

# Product Categories

## Optical Components - Filters, Mirrors, Other

Berliner Glas KGaA Herbert Kubatz GmbH & Co.

Rigaku Innovative Technologies, Inc.

## Optical Components - Lenses

Inko Industrial Corp.

Rigaku Innovative Technologies, Inc.

SwissOptic AG

Vistec Electron Beam GmbH

Zygo Corporation

## Optical Data Storage

Storex Technologies

## Optical Design and Engineering

Owens Design, Inc.

Rigaku Innovative Technologies, Inc.

Zygo Corporation

## Optical Fabrication Equipment

PI (Physik Instrumente)

## Optics Manufacturing

Energetiq Technology, Inc.

micro resist technology GmbH

Rigaku Innovative Technologies, Inc.

SAES Pure Gas, Inc.

SwissLitho AG

SwissOptic AG

Vistec Electron Beam GmbH

Zygo Corporation

## Optomechanical Components, Devices

Berliner Glas KGaA Herbert Kubatz GmbH & Co.

& Co.

## Positioning Equipment, Motion Control and Accessories

attocube systems Inc.

PI (Physik Instrumente)

Zygo Corporation

## Publishers, Associations, Clusters, Societies

Photonics Online

## Semiconductor Manufacturing

aBeam Technologies, Inc.

Berliner Glas KGaA Herbert Kubatz GmbH & Co.

& Co.

Carl Zeiss SMS GmbH

Gudeng Precision Industrial Co., Ltd.

JSR Micro, Inc.

micro resist technology GmbH

Opto Diode Corp.

Owens Design, Inc.

Pozzetta, Inc.

Raith America, Inc.

SAES Pure Gas, Inc.

SOKUDO Co. Ltd / SCREEN / DNS Electronics

Storex Technologies

SwissLitho AG

SwissOptic AG

Synopsys Inc.

Tokyo Electron Limited

Vistec Electron Beam GmbH

## Software

aBeam Technologies, Inc.

Carl Zeiss SMS GmbH

## Solar & Alternative Energy

Owens Design, Inc.

## Test and Measurement, Metrology

attocube systems Inc.

J.A. Woollam Co., Inc.

Opto Diode Corp.

Owens Design, Inc.

Zygo Corporation

## Vacuum, Cooling, Gas Handling Equipment

attocube systems Inc.

Owens Design, Inc.

SAES Pure Gas, Inc.

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## Single Wafer Thin Film Processing Systems

### *Cleaning • Deposition • Etching*

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**LSC-4000 Large Substrate Cleaner**

### **Wet Cleaning:**

#### Cleaning Applications

- Si and Sapphire Wafers
- Wafer Frame
- Display Panel
- ITO Substrate
- Patterned and Un-patterned Contact Masks
- Pelliclized Reticule
- In Situ Etch/Strip/Clean

#### Features

- 450mm or up to 21" OD, 15"x15" Substrates
- Megasonic DI, Brush, Chemical Dispense
- IR Heating
- PC Controlled with LabVIEW Software
- Touchscreen User Interface
- Manual Load and Unload
- Small Footprint 30"D x 26"W

#### Options

- Piranha Cleaning
- High Pressure DI
- Heated DI or Chemicals
- Ozonated DI Water (20 ppm of O<sub>3</sub>)
- Robotic Loading/Unloading with EFEM and SMIF Interface

### **Ion Beam Cleaning:**

#### Features

- Ion Beam: Up to 2KV/10mA
- Ion Current Density 100-360  $\mu\text{A}/\text{cm}^2$
- Ion Beam Size: 4", 5", 6"
- Compatible with Reactive and Non Reactive Gases (Ar, O<sub>2</sub>, CO<sub>2</sub>, CF<sub>4</sub>, Cl<sub>2</sub>)

#### Applications

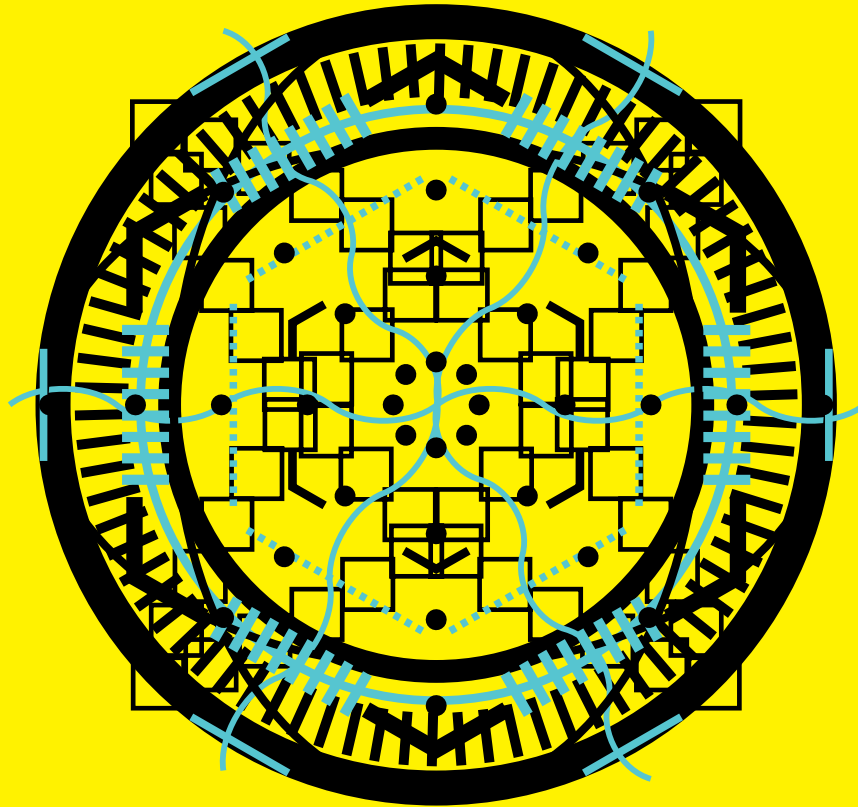
- Surface Cleaning
- Surface Treatment
- Ion Beam Milling
- Ion Beam Etching with Reactive Gases (RIBE): Gratings, Deep Trenches on SiO<sub>2</sub>, Si and Metals

### **Other Systems:**

**Deposition:** E-Beam and Thermal Evaporation, PECVD, PLD, DLC, DC & RF Sputtering, Ion Beam Sputtering

**Etching:** RIE, DRIE, ICP, Ion Beam, RIBE, Plasma

**Growth:** ALD, PA-MOCVD, CNT, Graphene



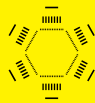
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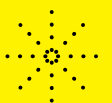
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