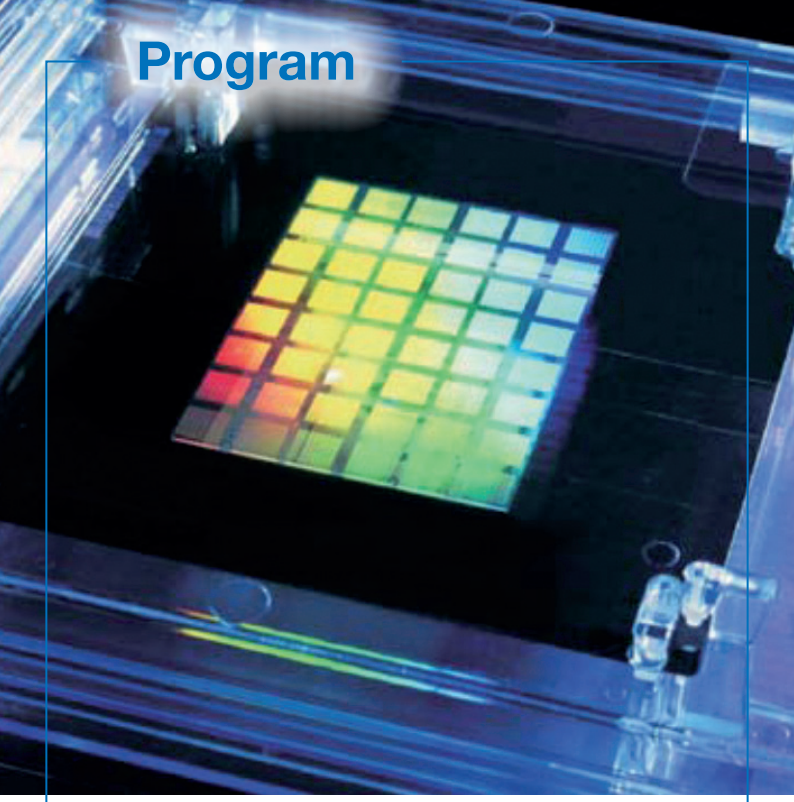
Program



Picture: Courtesy of Tekscend Photomask

The 41st European
Mask and Lithography
Conference

EMLC'26 JENA

June 22–24, 2026
Volkshaus, Jena, Germany

www.emlc-conference.com

VDE VDI GMM

41st European Mask and Lithography Conference EMLC 2026

Jena, Germany
Monday, June 22nd – Wednesday, June 24th, 2026

Welcome to the EMLC 2026 in Jena

The EMLC Conference annually brings together scientists, researchers, engineers and technicians from research institutes and companies from around the world to present their latest findings in mask and lithography techniques.

The EMLC Conference is dedicated to research, technology and related processes. It provides an overview of the current state of mask and lithography technologies and future strategy. Mask manufacturers and users have the opportunity to familiarize themselves with the latest developments and results.

May we offer you a fancy quick look through the telescope? Here is a brief summary of the conference programme:

Conference start is Monday, June 22nd at 1 PM with the Keynote of Anthony Yen, ASML, who will talk about „Imaging near the resolution limit: from Abbe's theory of microscopy to the high-NA EUV lithography", followed by a Tutorial Session and lectures within the following sessions:

- Simulation Methods and OPC / ILT Mask Corrections
- Wafer Lithography and Patterning

Don't miss the Get Together at the Volkshaus starting at 7 PM.

Sessions on Tuesday, June 23rd, 2026

Look forward to two keynote speeches on Tuesday: Andreas Tünnermann, Fraunhofer IOF, gives a lecture on „Advanced lithography - enabler of micro- and nano-optical Systems" and the title of Jin Choi's presentation, SAMSUNG Electronics, is „Mask Technologies: Active Controller for the Semiconductor Business".

Further Sessions on Tuesday:

- Nano-Imprint Lithography and Photonics
- Nano-Imprint Lithography and Photonics
- EUV Lithography 1 + 2
- Poster Presentations

Enjoy the **EMLC Conference Dinner** on Tuesday Evening!

Sessions on Wednesday, June 24th, 2026

On Wednesday, the ZEISS Award for Talents in Photomask Industry for the Best Student Presentation will be conferred. The BACUS 2025 Best Paper and the PMJ 2026 Best Paper will then be presented.

Further sessions on Wednesday

- Sustainability & PMJ 2026 Best Paper
- Mask and Template Manufacturing
- Mask Inspection and Metrology 1 + 2
- Contamination Control

Parallel to the EMLC 2026 Conference, the „Technical Exhibition" will take place at the Jena Volkshaus.

May we also suggest you not only to benefit from the technical sessions and the exhibition of the EMLC Conference 2026, but also to enjoy the beautiful flair of the City of Jena!

Your EMLC 2026 Conference Chairs
Jo Finders and Ines Stolberg

List of Contents

The EMLC 2026 International Program Committee

Conference Chairs
Stolberg, Ines, Vistec Electron Beam, Jena, Germany
Finders, Jo, ASML, Veldhoven, The Netherlands

Co-Conference Chairs
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Hayashi, Naoya, DNP, Saitama, Japan

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Maas, Raymond, ASML, Veldhoven, The Netherlands
Maly, Enrico, Photronics MZD GmbH, Dresden, Germany
Matsumoto, Hiroshi, NuFlareTechnology, Yokohama, Japan
Muehlberger, Michael, Profactor GmbH, Steyr-Gleink, Austria
Noack, Nico, AMTC Dresden, Germany
Pain, Laurent, CEA Leti, Grenoble, France
Ronse, Kurt, IMEC, Leuven, Belgium
Scheruebl, Thomas, Carl Zeiss SMT GmbH, Jena, Germany
Schnabel, Ronald, VDE/VDI-GMM, Offenbach, Germany
Schneider, Jens, Infineon Technologies, Dresden, Germany
Schuch, Nivea, Applied Materials, Grenoble, France
Sundermann, Frank, STMicroelectronics, Crolles, France
Tchikoulaeva, Anna, Lasertec, Dresden, Germany
Tschinkl, Martin, Toppan Photomasks, Dresden, Germany
Varga, Ksenija, EV Group, St. Florian am Inn, Austria
Wurm, Stefan, ATICE LLC, Albany, NY, USA
Zeggaoui, Nassima, Siemens Industry Software, Meylan, France
Zurbrick, Larry, Keysight Technologies, Santa Clara, CA, USA

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During the conference:
Phone: +49 171 4695 118

13:00 - 13:15 **Welcome - 1**
by EMLC 2026 Conference Chairs
Ines Stolberg / Vistec Electron Beam (Germany)
Jo Finders / ASML (The Netherlands)
Ronald Schnabel / VDE-GMM (Germany)

13:15 - 14:20

Session 1: 1st Plenary

Chairs: Jo Finders / ASML (The Netherlands)
Martin Tschinkl / Tekscend Photomask (Germany)

Keynote 1
13:15 - 14:00 **Imaging near the resolution limit: from Abbe's theory of microscopy to the high-NA EUV lithography**
Anthony Yen / ASML (The Netherlands)

Invited
14:00 - 14:20 **A novel type of edutainment: Deutsches Optisches Museum**
Timo Mappes / Deutsches Optisches Museum, Jena / Friedrich-Schiller-Universität Jena (Germany)

14:20 - 15:00

Session 2: Tutorial Session

Chair: Nico Noack / AMTC (Germany)

Tutorial
14:20 - 15:00 **Mask Repair using E-Beam induced Chemistry**
Hubertus Marbach / Carl ZEISS SMT (Germany)

15:00 - 15:30 ***Coffee Break***

15:30 - 16:50

Session 3: Simulation Methods and OPC / ILT Mask Corrections

Chairs: Nassima Zeggaoui / Siemens Industry Software (France)
Andreas Erdmann / Fraunhofer IISB (Germany)

15:30 - 15:50 **Achieving sub-nanometer modeling accuracy for high-NA EUV optical proximity correction**
Chih-I Wei[1)], Zachary Levinson[2)], Philip C. W. Ng[3)], Cheng-Huei Lin[3)], Ming-Yun Chen[3)], Ting-Chun Liu[3)], Zhiru Yu[2)], Wolfgang Demmerle[4)], Ulrich Klostermann[4)] Soobin Hwang[5)], Werner Gillijns[5)], Victor Blanco[5)]
[1)] Synopsys Belgium BV;
[2)] Synopsys Inc., United States;
[3)] Synopsys Taiwan Co., Ltd.;
[4)] Synopsys GmbH, Germany;
[5)] imec, Leuven, Belgium

15:50 - 16:10 **Curvilinear MRC Mask Verification methodology**
Xiaolong Wang, Chieh-Miao Chang, Xuelong Shi, Darko Trivković , Renyang Meng, Balakumar Baskaran, Joost Bekaert, Kenichi Miyaguchi, Victoria Malacara, Vicky Philipsen / imec vzw, Leuven (Belgium);
Il-Yong Jang / Tekscend Photomask US Inc, Round Rock (USA);
Stefan Meusemann, Christian Buergel, Markus Bender / Advanced Mask Technology Center, Dresden (Germany);
Bríd Connolly, Andreas Frangen / Tekscend (Toppan) Photomask company, Dresden (Germany)

16:10 - 16:30 **An Iterative Runge-Kutta-based Computation Method for EUV LithographicPhotomask Modeling**
Ziyao Zhang, Haofeng Guo[1) 2) 3)], Site Zhang[1) 3)]
[1)] Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun (China)
[2)] University of Chinese Academy of Sciences, Beijing (China)
[3)] State Key Laboratory of Advanced Manufacturing for Optical Systems, Changchun (China)

Student

16:30 - 16:50 **Simulation model for maskless lithography based on digital mirror devices**
Felipe Benavides, Andreas Erdmann / Fraunhofer Institute for Integrated Systems and Device Technology, Erlangen (Germany); Matthias Nagel, Sebastian Degel / Limata GmbH, Munich (Germany)

16:50 - 17.00 ***Short Break***

17:00 - 18:40

Session 4: Wafer Lithography and Patterning

Chairs: Ines Stolberg / Vistec Electron Beam (Germany)
Ksenija Varga / EV Group (Austria)

Invited

17:00 - 17:20 **Challenges and Solutions for Flexible, Scalable, High-Throughput Digital Lithography**
Boris Považay, René Kropf, Martin Ortbauer, Alois Malzer, Bernd Thallner, Andreas Spitzer / EV Group, St. Florian am Inn (Austria)

17:20 - 17:40 **E-beam Cell Projection for 3D blazed gratings and curvilinear features**
Mathias Hädrich, E. Linn, S. Fasold, I. Stolberg, U. Weidenmüller / Vistec Electron Beam GmbH (Germany)

Student

17:40 - 18:00 **Role of shape approximation in determining waveguide properties using variable-shaped E-beam lithography**
H. Esfandiar[1) 2)], A. S. Perez[1) 2)], S. W. Schmitt[1) 2)], M. Banasch[3)], R. Kindler[1) 2) 4)], F. Eilenberger[1) 2) 4)], R. Geiß[1)]
[1)] Fraunhofer Institute for Applied Optics and Precision Engineering, Jena (Germany)
[2)] Friedrich Schiller University, Jena (Germany)
[3)] Vistec Electron Beam GmbH, Jena (Germany)
[4)] Max Planck School of Photonics, Jena (Germany)

18:00 - 18:20 **Automated Cell Projection detection and positioning for advanced e-Beam lithography applications**
Michael Krüger, C. Sambale, T. Michels, S. Stammberger, J. Klikovits, T. Morvan / GenISys GmbH, Unterhaching (Germany); A. Sittig, S. Martens, H. Sailer / Institut für Mikroelektronik Stuttgart, (Germany)

18:20 - 18:40 **Enhancing SWIR Device Fabrication Through Digital Lithography with Novel IR-Pass Resists**
Ksenija Varga[1)], Lisa Berger[1)], Tobias Zenger[1)], Boris Považay[1)], Johannes Koch[2)], Matthias Schicke[2)], Hirotaka Takishita[3)], Yoshiki Takahashi[3)], Yoshinori Taguchi[3)]
[1)] EV Group, St. Florian am Inn (Austria)
[2)] Fujifilm Electronic Materials Europe, Zwijndrecht (Belgium)
[3)] Fujifilm Electronic Materials Japan, Kanagawa (Japan)

18:40 - 19:00 **1x scanner lithography for AI hardware processing**
Marc Hennemeyer / SUSS MicroTec Solutions (Germany)

19:00 - 20:30 **EMLC 2026 Get Together at the Volkshaus**

09:00 - 09:10 **Welcome - 2**
by EMLC 2026 Conference Chairs
Ines Stolberg / Vistec Electron Beam (Germany)
Jo Finders / ASML (The Netherlands)
Ronald Schnabel / VDE-GMM (Germany)

09:10 - 09:40

Session 5: 2nd Plenary

Chair: Ines Stolberg / Vistec Electron Beam (Germany)

Keynote 2

09:10 - 09:40 **Advanced lithography - enabler of micro- and nano-optical systems**
Andreas Tünnermann, Falk Eilenberger, Uwe Zeitner / Fraunhofer-Institute for Applied Optics and Precision Engineering / Friedrich-Schiller-University, Institute for Applied Physics (Germany)

09:40 - 10:00 / 10:30 - 12:10

Session 6: Nano-Imprint Lithography and Photonics

Chairs: Bríd Connolly / Tekscend Photomask (Germany)
Nico Noack / AMTC (Germany)

Invited

09:40 - 10:00 **Nanoimprint lithography, the chosen strategy for nano-optics**
Theodor Nielsen / NIL Technology (Danmark)

10:00 - 10:30 ***Coffee Break***

Invited

10:30 - 10:50 **Silicon Photonics: a versatile technology from datacom to sensing applications**
Louise-Eugénie Bataille, Léopold Virot, Sébastien Cremer, Eva Kempf, Stéphane Monfray, Lorenzo Lazzari, Guillaume Bruel, Frédéric Boeuf / STMicroelectronics, Crolles (France)

Student

10:50 - 11:10 **Nano-Imprint for pulse compression gratings**
Tom Kretzschmar, Falk Eilenberger, Tino Benkenstein, Robert Leitel / Fraunhofer Institute for Applied Optics and Precision Engineering, Jena (Germany); Jaqueline Stauffenberg, Thomas Kissinger / Technische Universität Ilmenau (Germany)

11:10 - 11:30 **Monolithic Second Harmonic Wavefront Control Metasurfaces Fabricated by Carbon-Layer-Assisted Soft Mask Gallium Phosphide Patterning Scheme**
Muyi Yang, Isabelle Staude / Friedrich Schiller University /Abbe Center of Photonics / Max Planck School of Photonics, Jena (Germany); D. Pidgaykoa, / Friedrich Schiller University / Abbe Center of Photonics / Jena (Germany)

11:30 - 11:50 **OPC induced roughness on photonic devices and transition toward curvilinear OPC solutions**
Ujwol Palanchoke / Univ. Grenoble Alpes, Grenoble (France); Bilel Saidi, Nacer Zine El Abidine / SIEMENS EDA, Meylan (France)

Student

11:50 - 12:10 **Immersion lithography parameters tuning for Line-Edge-Roughness optimization for photonic waveguides applications**
Rita Chidoub[1) 2) 3)], Aurélie Le Pennec[1)], Florent Dettoni [1)], Ahmed Gharbi[2)], Maxime Besacier[3)]
[1)] STMicroelectronics, France
[2)] Univ. Grenoble Alpes, CEA, Leti, Grenoble, France
[3)] Univ. Grenoble Alpes, CNRS, Grenoble, France

12:10 - 13:10 *Lunch Break*

13:10 - 13:40

Session 7: 3rd Plenary

Chair: Thomas Scheruebl / Carl Zeiss SMT (Germany)

Keynote 3

13:10 - 13:40 **Mask Technologies: Active Controller for the Semiconductor Business**
Jin Choi / SAMSUNG Electronics

13:40 – 15:00

Session 8: EUV Lithography - 1

Chairs: Jo Finders / ASML (The Netherlands)
Chair: Nivea Schuch / Applied Materials (France)

13:40 - 14:00 **Metal-oxide resist height variations through pitch in EUV lithography**
Christoph Hauenstein, Bernardo Oyarzun Rivera, Ruben Maas, Gijsbert Rispens / ASML (The Netherlands); Achintya Kundu, Tibor Kuna, Alain Moussa, Mihir Gupta / IMEC (Belgium); Sonia Castellanos Ortega, Peter de Schepper / Inpria Corp. (USA)

14:00 - 14:20 **Exploring frequency doubling in EUVL: solutions and limitations**
Hazem Mesilhy, Doyun Kim, Ryan Ryoung Han Kim / imec, Leuven (Belgium); Wei Chien / Synopsys Taiwan Co., Ltd. (Taiwan); Chih-I Wei / Synopsys (Belgium); Thuc Dam / Synopsys, Inc. (United States)

14:20 - 14:40 **Systematic Study of Vector- and Pixel-based MPC for Curvature Control in High-NA EUV Masks**
Yohei Torigoe, Ahmad Syukri, Ai Kaneko, Masakazu Hamaji / Nippon Control System Corporation, Kanagawa (Japan)

14:40 - 15:00 **Enhancement of EUV Optics at ZEISS and Future Developments**
Helene Plank, Jens Timo Neumann, Thilo Pollak / Carl Zeiss SMT GmbH, Oberkochen (Germany)

15:00 - 15:30 *Coffee Break*

15:30 – 16:30

Session 9: EUV Lithography - 2

Chaisr: Albrecht Ehrmann / Carl Zeiss SMT (Germany)
Uwe Behringer / UBC Microelectronics (Germany)

15:30 - 15:50 **Metal-based membranes for EUV pellicles: high EUV transmittance, scanner-representative durability, and fracture behavior characterization**
Takashi Tanimura, Toshikatsu Kashiwaya, Shoji Tange, Yasuaki Tanaka, Hiroki Iida, Kenta Muneoka, Tokio Kanbe, Koei Shimosato, Koichi Masuda, Takashi Ryu / NGK Corporation, Nagoya (Japan)

15:50 - 16:10 **Comparative analysis of Mask-3D-induced imaging degradations in high- and hyper-NA EUV lithography**
Markus Schröfl, Jan Werschnik / Photonics Precision Engineering GmbH, Jena, (Germany)

Invited

16:10 - 16:30 **EUV holography - a new patterning mode for the PSI interference lithography facility**
Iacopo Mochi, Dimitrios Kazazis, Iason Giannopoulos, Michaela Vockenhuber, David Piguet, Yasin Ekinci / Paul Scherrer Institute - Center for Photon Science, Villigen PSI (Switzerland)

16:30 – 18:20

Session 10: Poster Presentations

Chairs: Gerardo Bottiglieri / ASML (The Netherlands)
Ines Stolberg / Vistec Electron Beam (Germany)
Hans Loeschner / IMS Nanofabrication (Austria)
Hiroshi Matsumoto / NuFlare Technology (Japan)
Thomas Scheruebl / Carl Zeiss SMT (Germany)

Novel Lithographic Technologies / Direct Write Lithography and Patterning

P-1 **Optical lithography stepper with Type I dif fraction photons in Projection Quantum Optical Lithography**
Eugen Pavel / Storex Technologies, Bucharest (Rumania)

P-2 **Potential of maskless exposure tool: evaluation and analysis for MEMS applications**
Marco Salina, Aldo Bortolotti, Marco Dosi, Nadia Galimberti / STMicroelectronics, Agrate Brianza (Italy) Tobias Zenger, Ksenija Varga, Pierre Delbos, Bernd Dielacher / EV Group, St. Florian am Inn (Austria)

P-3 **Stacked grayscale lithography using intra-level e-beam exposure on latent resist image of i-line structures using specialized data preparation methods**
Markus Gottwald, Nikola Kohlschreiber, Sebastian Schermer / Fraunhofer Institute for Electronic Nano Systems, Chemnitz (Germany); Ritesh Ambar, Christian Helke, Danny Reuter / Fraunhofer Institute for Electronic Nano Systems, Chemnitz / Technische Universität Chemnitz, Chemnitz (Germany); Eike Linn, Ulf Weidenmüller / Vistec Electron Beam GmbH, Jena (Germany)

P-4 **Development and evaluation of novel polymers for next generation EBL resists**
Nikola Kohlschreiber, Markus Gottwald / Fraunhofer Institute for Electronic Nano Systems ENAS, Chemnitz (Germany); Vy Dinh, Tobias Kirschbaum, Roland Klein / Fraunhofer Institute for Structural Durability and System Reliability LBF, Darmstadt (Germany); Christian Helke, Danny Reuter / Fraunhofer Institute for Electronic Nano Systems ENAS, Chemnitz / Technische Universität Chemnitz, ZfM (Germany)

P-5 **Toward mix&match KrF DUV & EBL in a CMOS 300mm cleanroom: integration challenges and lessons learned**
Varvara Brackmann, Anja Banholzer, André Flemming, Norbert Hanisch, Nico Lindner, Michael Friedrich, Amir Abbas Zolfaghari, Arne Demmler, Konrad Seidel / Fraunhofer IPMS CNT, Dresden (Germany)

P-6 **Sub-resolution pillar fabrication by layout inversion and geometry optimization in variable shape beam e-beam lithography**
Amir Abbas Zolfaghari, Michael Friedrich, Arne Demmler, Varvara Brackmann / Fraunhofer IPMS CNT, Dresden (Germany)

EUV Lithography, Mask and Pellicles

P-7 **Investigation of Anamorphic Reduction in Hyper-NA EUV**
Lin Han, Gerardo Bottiglieri, Robert de Kruif / ASML Netherlands B.V., Veldhoven (The Netherlands); Michael Patra / Carl Zeiss SMT GmbH, Oberkochen (Germany)

P-8 **Fluorescent Nanodiamond Thin-Film Scintillators for Ultra-High Resolution Characterization of Advanced EUV Beam Profiler**
Yu-Chan Lin[a], Tzu-Ping Huang[b], Yu-Hsin Yang[c], Ya-Ting Kang[d], Pei-Jie Wu[e], Huan-Cheng Chang[e, f], Chi-Chung Kei[a], Chi-Hung Hwang[a], Nien-En Tsai[g], Yi-Cheng Zhang[d] , Teng-I Yang[a]
[a)] National Center for Instrumentation Research
[b)] National Synchrotron Radiation Research Center
[c)] Graduate Institute of Communication Engineering, National Taiwan University
[d)] Dept. of Physics, National Chung Cheng University
[e)] Dept. of Chemistry, National Taiwan Normal University
[f)] Institute of Atomic and Molecular Sciences, Academia Sinica
[g)] Dept. of Chemical Engineering, National Taiwan University

P-9 **Decoupling reticle and scanner contribution to contact-hole LCDU using SubE0- and RSEM- based intrafield correction**
Lionel Dos Ramos, Hidde Keizers, Tasja van Rhee / ASML, Veldhoven (The Netherlands)

P-10 **Sharpening Patterning Fidelity: Wafer intra-Field Overlay and CDU Errors Reduction via Laser Processing on EUV Reticles**
Yogev Baruch, Shimrit Tamam, Avi Cohen, Hillel Zalcman / Carl Zeiss SMT GmbH, Misgav (Israel)

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Yunsoo Kim, Dongmin Jeong, Seungho Lee, Seunchan Lee, Jinho Ahn, Taeho Leeb / Hanyang University, Seoul (Republic of Korea)

P-12 **Nanosecond-Resolved Temperature and Stress Measurement on EUV Reticles and Pellicles**
Görsel Yetik, Shriparna Mukherjee, Ruben Betsema and Peter van der Walle / TNO (The Netherlands)

Simulation Modelling

P-13 **Gas-phase chemistry modelling of High-Pressure Residual Gas Amalyzer (HR-RGA) ion source for improving accuracy of in-situ diagnostics in lithography systems**
Marina Gomes Rachid, Timo Huijser, René Koops, Matheus Martinez Garcia, Andrey Ushakov, Eleftheria Mavroforaki, Bert van der Zwan, Henk Lensen / TNO, the Organization of Applied Scientific Research, Delft (The Netherlands)

P-14 **An open-source High-NA EUV Lithography Simulator**
Masayuki Shimoda, Hiroyoshi Tanabe, Atsushi Takahashi / Institute of Science, Tokyo (Japan)

P-15 **Student**
Fixing non-convergent Born Series through Rachford splitting
Frank van der Ceelen, Wim M.J.M. Coene / Delft University of Technology, Delft (The Netherlands)

Mask Manufacture

P-16 **Performance of MBM™-2000C, a multi-beam writer for mature nodes**
Ducksun Yang / NuFlare Korea, Inc. (Republic of Korea); Hiroshi Matsumoto, Rieko Nishimura, Masato Saitob / NuFlare Technology, Inc., Kanagawa (Japan)

P-17 **Enabling Placement Metrology on Phase-Shift Photomasks at Mature Nodes**
Cynthia Chen, Peter Henriksson, Xueying Hai, Robert Eklund, Mikael Wahlsten / Mycronic AB (Sweden); Masayoshi Kita, Takeru Nakaya, Yoshiaki Miyata, Hisao Ito, Kenji Go / Mycronic Technologies Corporation (Japan); Nobuaki Fujii, Sotaro Hosoya, Yoshihiro Niioka, Hirofumi Yamaguchi, Shingo Yoshikawa / Dai Nippon Printing Co., Ltd. (Japan)

Metrology of Masks and Tools

P-18 **At-Wavelenght Metrology facility for EUV, XUV and tender X-ray energy range optics**
Andrey Sokolov, Frank Eggenstein, Peter Bischoff, Jonathan Weck, Manuel Noppel, Marcel Mertin, Ingo Packe, Frank Siewert, Jens Viefhaus / Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin (Germany)

P-19 **Recipe for detecting mask house CD metrology mismatch using wafer dose-to-size for 130nm node manufacturing**
Temitope Onanuga, Maria Esche, Nicolo Morgana, Udo Goetschkes / Infineon Technologies Dresden AG & Co. KG, Dresden (Germany)

P-20 **Understanding MOR pattern density sensitivity and its mitigation through process optimization**
Pervaiz Kareem, Werner Gillijns / IMEC, Leuven (Belgium)

P-21 **Student**
Surface-sensitive metrology on periodic nanostructures with various X-ray methods
Vinh-Binh Truong, Analía Fernández Herrero, Victor Soltwisch, Burkhard Beckhoff / Physikalisch-Technische Bundesanstalt (PTB), Berlin (Germany); Janusz Bogdanowicz / imec, Leuven (Belgium); Philipp Hönicke / Helmholtz Zentrum Berlin (Germany)

P-22 **AIMS® AutoAnalysis: the highly utilized standard for automated defect review on aerial images**
Thomas Zeuner, Philipp Schoeppe, Matthias Haack, Kay Dornbusch, Ute Buttgereit / Carl Zeiss SMT GmbH, Jena (Germany)

Mask Reuse and Cleaning

P-23 **Advances in reusable mask patterning**
Marco Piccinni[a], Chiara Lambruschini[a], Simona Delsante[a], Michael Casale[a], Andrea Capettini[a], Christian Rossi[a], Andrea Messina[a], Alexander Omelianchik[a], Sawssen Slimani[a], Irina Gushchina[a], Pierfrancesco Maltoni[a], Fatemeh Shahbazi Farahani[a], Alessio Aroni[a], Luca Benelli[a], Sascha Sadewasser[a], Diego Colombara[a] ; Maria De Lourdes Gonzalez Juarez[b]; Jordy Queiros Campos[c], Charlotte Hurel[c], Olga Volkova[c], Guilhem Godeau[c], Yassine Ben Tahar[c], Jessica Alves Marins[c], Nikolaos Ntallis[c]; Marianna Vasilakaki[d], Claudia Coelho[d], Pavel Kuzhir[d]; Pablo Valentim[e], Tim Böhnert[e], André Silva[e], Carlos Rosário[e], Margaret Costa[e], Carlos Marques[e], Pedro Anacleto[e], Ricardo Ferreira[e], João Piteira[e], Pauline Rullière[e], Popi Trohidou[e]; Tobias Burton[f], Matjaž Koželj[f], Anais Falgayrat[f], Coralie Bayol[f], Salomé Gasso Gelly[f], Tom Douzou[f], Florine Legrand[f], Emma Bremond[f], Tom Gouveia[f], David Ressegotti[f]; Valerio Pagliarella[g], Emilio De Gaetani[g], Gary Friedman[g]; Jamal Al-Hourani[h], Davide Peddis[h]
[a)] Università degli Studi di Genova (Italy)
[b)] University of Luxembourg (Luxembourg)
[c)] Centre National de la Recherche Scientifique (France)
[d)] National Center for Scientific Research "Demokritos" (Greece)
[e)] International Iberian Nanotechnology Laboratory (Portugal)
[f)] Solvionic SA (France)
[g)] RINA (Italy)
[h)] Drexel University (USA)

P-24 **Dry cleaning solution for advanced photomasks**
Christof Baur, George-Gabriel Baralia, Tilmann Heil, René Kullock, Kinga Konilov / Carl Zeiss SMT (Germany)

Late Poster Submissions

P-25 **Student**
Annotation-free defect detection in SEM images of contact holes using generative diffusion
Efi-Maria Papia / N.C.S.R. Demokritos, Agia Paraskevi / Department of Physics, University of Athens (Greece); Alex Kondi, Evangelos Gogolides, Vassilios Constantoudis / N.C.S.R. Demokritos, Agia Paraskevi / Nanometrisis p.c., Agia Paraskevi (Greece)

P-26 **Machine-Learning-based 3D reconstruction of line/space patterns from 2D SEM images: Denoising and AFM-based validation**
Alex Kondi [1) 3) 4)], Efi-Maria Papia[1) 2)], Vassilios Constantoudis[1) 3)], Jean-David Isasa[5)], Yasin Ekinci[5)], Dimitris Kazazis[5)], Benedicte Mortini[6)], Johannes Degenhardt[4)], Jan Thiesler[4)] and Gaoliang Dai[4)]
[1)] Institute of Nanoscience and Nanotechnology (Greece)
[2)] Departmen t of Physics, University of Athens, (Greece)
[3)] Nanometrisis p.c., (Greece)
[4)] Physikalisch-Technische Bundesanstalt, (Germany)
[5)] PSI Center for Photon Science (Switzerland)
[6)] STMicroelectronics (France)

P-27 **Resolution Enhancement Strategies for Maskless Direct-Write Lithography**
Matthias Wahl[a], Steffen Diez[a], Sven Preuss[a], Benedikt Stender[a], Emine Cagin[b], Holger Sailer[c], Angela Schneider[c]
[a)] Heidelberg Instruments Mikrotechnik GmbH Heidelberg (Germany)
[b)] Heidelberg Instruments Nano AG, Zurich (Switzerland)
[c)] IMS Chips, Stuttgart (Germany)

18:30 ***Bus departure***

19:00 - 22:00

EMLC 2026 Conference Dinner at IMAGINATA

Details please see at page 30

09:00 - 09:20

ZEISS Award and Announcements of BACUS 2025 and PMJ 2026

ZEISS Award for Talents in Photomask Industry (for the Best Student Presentation)
Thomas Scheruebl / Carl Zeiss SMT (Germany)

PMJ 2027 Announcements
t.b.d

BACUS 2026 Announcement
Thomas Scheruebl / Carl Zeiss SMT (Germany)

09:20 - 10:00

Session 11: Sustainability & PMJ 2026 Best Paper

Chairs: Gerardo Bottiglieri / ASML (The Netherlands)
Reinhard Galler / EQUIcon (Germany)

Invited
09:20 - 09:40 **Sustainability as an innovation driver for semiconductor manufacturing and R&D engineering**
Bertrand Le Gratiet, Natalia Potrzebowska, Lilian Assier, Nathalie Charras, Benedicte Mortini, Olivier Mermet / STMicroelectronics, Crolles Cedex (France);
Amandine Saint Blancat, Eric Barde, Arnaud Regnier / STMicroelectronics, Rousset (France)

Invited
09:40 - 10:00 **Photomask Japan 2026 Best Paper**
PMJ-2026 Best Paper
to be defined after April 10

10:00 - 10:30 ***Coffee Break***

10:30 - 12:10

Session 12: Mask and Template Manufacturing

Chairs: Thomas Scheruebl / Carl Zeiss SMT (Germany)
Anna Tchikoulaeva / Lasertec U.S.A., Inc. Zweigniederlassung Deutschland (Germany)

10:30 - 10:50 **Extending Laser Mask Writers for Curvilinear Photomask Applications**
Tine Libbrecht, Adem Ergül, Martin Glimtoft, Alexandra Baum, Charles Björnberg, Xueying Hai, Robert Eklund, Mikael Wahlsten / Mycronic AB., Täby (Sweden); Linyong (Leo) Pang, Kechang Wang / D2S (USA)

10:50 - 11:10 **Fabrication of Nanoimprint templates for scalable and shape-flexible patterning**
Ryugo Hikichi, Masakazu Mori, Takaharu Nagai, Mitsuru Kondo, Kimio Ito, Yoshio Makino; Hisayoshi Watanabe, Hideki Cho, Shingo Yoshikawa / Dai Nippon Printing Co., Ltd. (Japan)

11:10 - 11:30 **Multi-beam mask writer MBM-4000: enhancements for productivity**
Hiroshi Matsumoto, Yuji Fujiwara, Haruyuki Nomura, Kenta Fukuoka, Toshihiro Saga, Kenichi Yasui, Jumpei Yasuda, Yoshinori Kojima / NuFlare Technology, Inc., Kanagawa (Japan)

11:30 - 11:50 **MBMW 401 - High-Performance Multi-beam Mask Writer for High-NA EUV**
Matthias Liertzer, Johannes Leitner, Peter Fiala, Peter Hudek, Hans Loeschner, Elmar Platzgummer / IMS Nanofabrication GmbH, Brunn am Gebirge (Austria)

11:50 - 12:10 **Holistic Design and Optimization of Next-Generation EUV Mask Blanks for Advanced Nodes**
Bryan S. Kasprowicz / HOYA Corporation (USA); Takahiro Onoue, Yohei Ikebe, Hibiki Kishida / HOYA Corporation (Japan)

12:10 - 13:10 ***Lunch Break***

13:10 - 14:00

Session 13: 4th Plenary

Chairs: Jo Finders / ASML (The Netherlands)
Hans Loeschner / IMS Nanofabrication (Austria)

Keynote 4

13:10 - 13:40 **Quo Vadis EUV Mask technologies and ecosystem - an equipment supplier's perspective**
Clemens Neuenhahn / Carl Zeiss SMT (Germany)

Invited

13:40 - 14:00 **BACUS 2025 Best Paper**
Novel capping layer evaluation for EUV mask
Chien-Hua Wang[1], Hsin-Ya Sung[1], Chih-Chen Yang[1], Kuo-Lun Tai[2], Hung-Ju Tien[2], Yen-Liang Chen[2], Lee-Feng Chen[2], Chien-Min Lee[2], Yen-Lin Huang[1], Wen-Wei Wu[1]
[1)] National Yang-Ming Chiao Tung University (Taiwan)
[2)] E-Beam Operation TSMC (Taiwan) Hsinchu City, Taiwan

14:00 - 15:00

Session 14: Mask Inspection and Metrology - 1

Chairs: Jan Hendrik Peters / bmbg consult (Germany)
Aurélien Fay / CEA-Leti (France)

Invited

14:00 - 14:20 **New Development in EUV Photomask Metrology and Inspection**
Hyonseok Song, Yong Woo Kim, Seulki Roh, Jisu Lee, Hongyul Jung, Sukjong Bae, Jin Choi / Semiconductor Research & Development, Samsung Electronics Co., Ltd., Gyeonggi-do (Republic of Korea)

Invited

14:20 - 14:40 **Real-World Deployment of AI for Massive Metrology: Accelerating Next Generation Semiconductor Development**
Hansaem Park, Yoonsung Bae, Chulmoo Kang and Myungjun Lee / Semiconductor Research & Development, Samsung Electronics Co., Ltd. (Republic of Korea)

Invited

14:40 - 15:00 **Addressing Reticle Inspection Needs for Legacy Technology Nodes**
Anna Tchikoulaeva / Lasertec U.S.A., Inc. Zweigniederlassung Deutschland (Germany); Takayuki Yamamoto, Kazuya Tsurumoto, Karl Halbaeck, Atsushi Tajima / Lasertec Corp. (Japan)

15:00 - 15:30 ***Coffee Break***

15:30 - 17:00

Session 15: Mask Inspection and Metrology - 2

Chairs: Jan Hendrik Peters / bmbg consult (Germany)
Xuyeying Hai / Mycronic (Sweden)

15:30 - 15:50 **A new CD SEM based method for special local registration characterization in next generation EUV mask manufacturing**
Annemarie Benedikt, Jan Lorbeer / Advanced Mask Technology Center Dresden GmbH & Co.KG (Germany)

15:50 - 16:10 **High-Precision Curvilinear Metrology and Design-Based Metrology Technology for Advantest's Mask CD SEM**
Ryuichi Ogino, Masahiro Takizawa, Wataru Ito, Tatsuro Okawa, Shida Soichi, Toshimichi Iwai / Advantest Corp., Saitama R&D Center, Saitama (Japan); Balakumar Baskaran, Joost Bekaert, Darko Trivkovic, Kenichi Miyaguchi / imec vzw, Leuven (Belgium)

16:10 - 16:30 **EUV mask defectivity assessment th-rough PDM characterization study**
Henry Kamberian, Jinju Beineke, Yeu Dong Gau, Michael Green, Mohamed Ramadan / Photronics Inc.,Boise, ID, (USA); Nicole Wu, Su-Jung (Gloria) Ye, Chun-Cheng Liao / Nanya Technology Corp., New Taipei City (Taiwan)

16:30 - 16:50 **Non-destructive characterization of EUV mask via machine-learning-enabled scatterometry using table-top 92eV HHG source**
Vitaly Krasnov, Esben Witting Larsen, Kevin Dorney, Vicky lipsen, Rik Jonckheere / imec, Leuven (Belgium); Len Pasic, Warre Heylen, Claudia Fleischmann / imec and Quantum Solid-State Physics Group, Leuven (Belgium)

16:50 - 17:10 **Advances with High-NA aerial image metrology with AIMS® EUV 3.0**
Sven Krannich, Julian Ott, Daniel Boecker, Swen Ballof / Carl Zeiss SMT GmbH, Oberkochen (Germany); Joerg Petschulat / Carl Zeiss SMT GmbH, Jena (Germany); Sascha Perlitz / Carl Zeiss SMT GmbH, Oberkochen (Germany) / Carl Zeiss SMT GmbH, Jena (Germany)

17:10 - 18:10

Session 16: Contamination Control

Chairs: Jens Schneider / Infineon Technologies (Germany)
James Jefferies / HOYA Europe, London, UK

17:10 - 17:30 **Material degradation-induced dose shift in advanced lithography: The role of mask oxidation**
Anthony Zhaohui Zhou, Sia Kim Tan, Kar Kit Koh, Daniel Costello / GlobalFoundries (Singapore); Daniel Costello, Sierra Shapiro / GlobalFoundries, Malta (USA); Dirk Utess / GlobalFoundries, Dresden (Germany; Timo Wandel, Stephanie Winkelmeier, Martin Sczyrba / Advanced Mask Technology Center, Dresden (Germany)

17:30 - 17:30 **Impact of oxygen plasma cleaning on Pt-coated surfaces for semiconductor applications**
Samira Naghdi / Physikalisch-Technische Bundesanstalt (PTB), Berlin (Germany); Andrey Sokolov, Frank Eggenstein, Anna Makarova, Frank Siewert, Grzegorz Gwalt / Helmholtz Zentrum Berlin (HZB) (Germany)

17:50 - 18:10 **Chemical contamination by so called condensables: paradigm shift from VOC to SVOC**
Dr. Markus Keller, Dr. Udo Gommela / Fraunhofer Institute for Manufacturing Engineering and Automation IPA, Stuttgart (Germany)

18.10 - 18:15 **Thanks to all EMLC 2026 Presenters & Participants**
by EMLC Conference Chairs Ines Stolberg / VISTEC and Jo Finders / ASML

Announcement of the 42nd European Mask and Lithography Conference EMLC 2027
taking place at the Hilton Hotel Dresden (Germany) in June 2027

End of the 41st European Mask and Lithography Conference (EMLC 2026)

Conference Information

Conference Hours

Monday, June 22nd, 2026	11:00 to 19:00
Tuesday, June 23rd, 2026	08:30 to 19:00
Wednesday, June 24th, 2026	08:30 to 18:15

Registration Hours

Monday, June 22nd, 2026	13:00 to 18:00
Tuesday, June 23rd, 2026	08:00 to 18:00
Wednesday, June 24th, 2026	08:00 to 14:00

Technical Exhibition

Parallel to the conference presentations we offer you to take part in the technical exhibition.

EMLC Best Contribution Award

The EMLC Program Committee will elect a Best Contribution Award.

The winner will be invited either to present at PMJ 2027 in Yokohama, Japan, or at the SPIE Photomask Technology ('BACUS') & EUV Lithography Conference 2027.

ZEISS Award for talents in Photomask Industry

Since 2016, ZEISS Semiconductor Mask Solutions (SMS) has been supporting students working in the fields of photomasks. Contributions will be judged for technical merit, relevance of the topic to the industry and the author's ability to explain the work.

Winners will be awarded a ZEISS certificate and a trophy. He or she will be invited to the ZEISS European Summer School in Oberkochen, Germany, where students get deep insights into ZEISS' semiconductor optics manufacturing and related aspects of semiconductor technology. The event is triggered by the Important Project of Common European Interest (IPCEI) to support research, innovation and the first industrial deployment of microelectronics and communication technologies across the value chain.

Travel costs for the ZEISS European Summer school will be covered. In addition, a donation to the amount of 2,500 EUR will be granted.

General Information

EMLC 2026 Office

For detailed information please contact:

VDE/VDI Society Microelectronics Microsystems and Precision Engineering (GMM)
Dr. Ronald Schnabel
Merianstraße 28
63069 Offenbach am Main, Germany

Phone: +49 69-6308-227
e-Mail: gmm@vde.com

During the conference:
Phone: +49 171 4695 118

Conference Fees

	until May 22nd, 2026	after May 22nd, 2026
Regular	€ 780.00	€ 880.00
VDE, VDI Members*	€ 750.00	€ 850.00
Lecturers, Program Committee Members	€ 590.00	€ 690.00
Students**	€ 150.00	€ 200.00

* Participants claiming for the membership fee must verify their membership.

** A copy of the student card must be attached.

Conference Participation includes

- Coffee breaks and lunch during the conference
- Participation at the EMLC 2026 Get Together at the Jena Volkshaus on Monday, June 22nd.
- EMLC 2026 Conference Dinner at the imaginata event facilities Jena on June 23rd, 2026.
- Free access to the EMLC 2026 Technical Exhibition at the Jena Volkshaus.

Payment of Conference Fee

Payment for registration, including bank charges and processing fees, must be made in Euro. The conference fee must be fully paid in advance by credit card. Your registration can only be confirmed if VDE-Conference Services has recorded receipt of your full payment.

Cancellation

In case of cancellation, provided that VDE-Conference Services has received written notice until 30 days before the event, the registration fee will be fully refunded less a handling fee of 80,- EUR. In case of cancellation after this date, no refund will be made.

Conference Venue

Event Location in the Jena Volkshaus – an institution of JenaKultur
Volkshaus Jena
07743 Jena, Germany
www.volkshaus-jena.de
Phone: +49 (0) 3641 49-8000

Dinner Event on June 23st, 2026

For Tuesday evening, June 23, after the Poster Session, we have organized the Conference Banquet Dinner at IMAGINATA.

Schedule Dinner Event

18:00 and 18:30: Bus service to IMAGINATA
Bus departure from the Volkshaus.

19:00 Start of the guided tours at IMAGINATA

20:30 Conference Dinner

22:00 and 22:30: Busses depart from Imaginata to the Volkshaus. Stops at the Dorint Hotel and the MAXX Hotel.

Address IMAGINATA

Löbstedter Straße 107, 07749 Jena

What is IMAGINATA?

IMAGINATA: Science that moves all the senses

Feel, hear, see, marvel, and experiment yourself: Imaginata is an extraordinary place of discovery where scientific phenomena can be explored playfully. The expansive interactive park sees itself as a true sensory experience and makes science not only visible, but directly tangible.

Sightseeing in Jena

Jena City Tour on Monday, June 22nd, 2026, 10:00

From a global perspective, Jena has been a hotspot for optics and photonics for over 150 years. It is the beginning of the scientifically based construction of microscopes that is closely related to the university city. This innovation enabled numerous breakthroughs in the natural and life sciences. Other examples are the design of spectacle lenses as they are produced today, being introduced here in 1912.

The German Future Prize as most prestigious innovation award in Germany, has been awarded to researchers from Jena for the fourth time – always for solutions and products in optics and photonics.

Would you like to join us on a journey of discovery across Jena?

With the walk we will visit some historic sites including a table jointly used by both Goethe and Schiller.

Walk to the Ernst Abbe Monument, each conference day during lunchtime

May we invite you to visit with us the monument dedicated to Ernst Abbe (1840-1905) which was built with donations from the people of Jena!

The Program Committee of the 41st European Mask and Lithography Conference would like to express their sincere appreciation to all the sponsors and coopering partners mentioned below for their support

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