

2017 Source Workshop

November 6-8, 2017

Dublin ■ Ireland

Workshop Proceedings



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2017 Source Workshop



2017 Source Workshop, Group Photo

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Workshop Proceedings

WORKSHOP AGENDA

2017 Source Workshop

November 6-8, 2017, Dublin, Ireland

Monday, November 6, 2017 (Ardmore House, UCD Campus)

5:30 - 7:00 PM Reception and Speaker Prep

Tuesday, November 8, 2017 (George Moore Auditorium, UCD Campus, Dublin)

9:15 AM Announcements and Introductions

Welcome -2017 Source Workshop

Vivek Bakshi
EUV Litho, Inc., USA

Welcome to UCD

Orla Feely
UCD

Announcements and Introductions (Intro-1)

Padraig Dunne
UCD

9:40 AM Session 1: Keynote Session -1

Session Chair: Padraig Dunne (UCD)

[EUV Source for High Volume Manufacturing: Performance at 250 W and Key Technologies for Power Scaling \(S1\) \(Keynote Presentation\)](#)

Igor Fomenkov
Cymer LLC, An ASML Company, San Diego, CA 92127, USA

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10:40 AM

Session 2: Fundamental Data

Session Chairs: Ronnie Hoekstra (ARCNL) and James Colgan (LANL)

[Tin Ion Spectroscopy on Plasma Sources of EUV Light \(S14\) \(Invited\)](#)

Ronnie Hoekstra

Advanced Research Center for Nanolithography (ARCNL), Science Park 110, 1098 XG Amsterdam, the Netherlands and

Zernike Institute for Advanced Materials, University of Groningen, 9747 AG Groningen, the Netherlands

[Atomic Data of Low-charged Sn ions for Lithography Applications \(S11\) \(Invited\)](#)

J. Colgan, D. P. Kilcrease, J. Abdallah, Jr., M. E. Sherrill, C. J. Fontes, and P. Hakeł
Los Alamos National Laboratory, Los Alamos, NM 87545

[EUV Spectra of Highly Charged-ions Observed with a Compact Electron Beam Ion Trap \(S12\) \(Invited\)](#)

Nobuyuki Nakamura¹, Safdar Ali¹, Hiroyuki Kato¹, and Emma Sokell²

¹*Institute for Laser Science, the University of Electro-Communications, Tokyo 182-8585, Japan*

²*School of Physics, University College Dublin, Belfield, Dublin 4, Ireland*

[Fundamental Studies of Sn⁷⁺-Sn¹⁴⁺ Ions with Applications for Laser Produced Plasma Sources \(S13\) \(Invited\)](#)

H. Bekker (1), F. Torretti (2, 3), A. Windberger (1, 2), A. Borschevsky (4), A. Ryabtsev (5, 6), S. Dobrodey (1), E. Eliav (7), U. Kaldor (7), E. V. Kahl (8), J. C. Berengut (8), W. Ubachs (2, 3), R. Hoekstra (2, 9), J. R. Crespo Lopez-Urrutia (1), and O. O. Versolato (2)

1 Max-Planck-Institut für Kernphysik, Heidelberg, Germany

2 Advanced Research Center for Nanolithography, Amsterdam, The Netherlands

3 Department of Physics and Astronomy, and LaserLaB, Vrije Universiteit, Amsterdam, The Netherlands

4 Van Swinderen Institute, University of Groningen, Groningen, The Netherlands

5 Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Moscow, Russia

6 EUV Labs, Ltd., Troitsk, Moscow, Russia

7 School of Chemistry, Tel Aviv University, Tel Aviv, Israel

8 School of Physics, University of New South Wales, Sydney, Australia

9 Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands

11:40 AM

Break (20 Minutes)

12:00 PM Session 3: Lasers

Session Chairs: Thomas Metzger (Trumpf) and Akira Endo (HiLase)

High Average Power and High Energy Ultrafast Thin-Disk Amplifiers (S31)

Thomas Metzger

TRUMPF Scientific Lasers GmbH & Co. KG, Feringastr. 10a, 85774 Unterföhring, Germany

High-harmonic Generation for Metrology Applications (S32) (Invited)

Johannes Weitenberg [1,2], Ioachim Pupeza [1,3], Akira Ozawa [1],

Tobias Saule [3], Jan Schulte [2], Hans-Dieter Hoffmann [2], Thomas Udem [1],

Peter Rußbüldt [2], Reinhart Poprawe [2,4], Theodor W. Hänsch [1,5]

[1] Max-Planck Institute of Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany

[2] Fraunhofer Institute for Laser Technology, Steinbachstr. 15, 52074 Aachen, Germany

[3] Ludwig-Maximilian University Munich, Faculty of Physics, Chair of Experimental Physics - Laser Physics, Am Coulombwall 1, 85748 Garching, Germany

[4] RWTH Aachen University, Chair for Laser Technology, Steinbachstr. 15, 52074 Aachen, Germany

[5] Ludwig-Maximilian University Munich, Faculty of Physics, Chair of Experimental Physics, Schellingstr. 4/III, 80799 München, Germany

Development of kW-level Picosecond Thin-disk Pre-pulse Laser for High-power EUV Sources (S33)

J. Mužík, M. Smrž, M. Chyla, O. Novák, A. Endo, T. Mocek

HiLASE Centre, Institute of Physics CAS,

Za Radnicí 828, 252 41 Dolní Břežany, Czech Republic

1:00 PM Lunch (60 Minutes)

2:00 PM Session 4: High Power LPP Sources for HVM

Session Chairs: Hakaru Mizoguchi (Gigaphoton) and Oscar Versolato (ARCNL)

[High Power LPP-EUV Source with Long Collector Mirror Lifetime for High Volume Semiconductor Manufacturing \(S41\) \(Invited\)](#)

Hakaru Mizoguchi, Hiroaki Nakarai, Tamotsu Abe, Krzysztof M Nowak, Yasufumi Kawasuji, Hiroshi Tanaka, Yukio Watanabe, Tsukasa Hori, Takeshi Kodama, Yutaka Shiraishi, Tatsuya Yanagida, Georg Soumagne, Tsuyoshi Yamada, Taku Yamazaki and Takashi Saitou

Gigaphoton Inc. Hiratsuka facility

3-25-1 Shinomiya Hiratsuka Kanagawa, 254-8567, JAPAN

[Two-dimensional Electron density and Temperature Profiles of EUV Light Sources with 4.0% CE \(S42\) \(Invited\)](#)

Kentaro Tomita¹, Yuta Sato¹, Syoichi Tsukiyama¹, Raimu Fukada¹, Fumitaka Ito¹, Kiichiro Uchino¹, Kouichiro Kouge², Tatsuya Yanagida², Hiroaki Tomuro², Yasunori Wada², Masahito Kunishima², Takeshi Kodama², Hakaru Mizoguchi²

¹ *Interdisciplinary Graduate School of Engineering and Sciences, Kyushu University, 6-1, Kasugakoen, Kasuga, Fukuoka 816-8580, JAPAN*

² *Gigaphoton Inc., 400 Yokokurashinden Oyama, Tochigi, 323-8558, JAPAN*

[Short-wavelength Out-of-band EUV emission from Sn Laser-produced Plasma \(S43\)](#)

Francesco Torretti

EUV Plasma Processes group, Advanced Research Center for Nanolithography (ARCNL), Science Park 110, 1098XG Amsterdam

[Vapor shielding of tin under intense plasma bombardment \(S45\) \(Invited\)](#)

T.W. Morgan, G.G. van Eden, D.U.B. Aussems, V. Kvon, M.A. van den Berg, K. Bystrov, M.C.M. van de Sanden

DIFFER—Dutch Institute for Fundamental Energy Research, De Zaale 20, 5612 AJ Eindhoven, The Netherlands

[ARCNL Source Project Update \(S46\) \(Invited\)](#)

Oscar Versolato

ARCNL

3:40 PM Break and Group Photograph (20 Minutes)

4:00 PM Session 5: EUV Source Modeling

Session Chair: Howard Scott (LLNL) and Padraig Dunne (UCD)

[Towards High-Fidelity Simulations of EUV Production from Laser-Produced Plasma \(S22\) \(Invited\)](#)

Howard Scott

Lawrence Livermore National Laboratory, Livermore, CA, USA

[Modeling of Particle Debris from the Target of Laser Produced Plasma EUV Sources \(S24\)](#)

Akira Sasaki

Kansai Photon Science Institute, National Institutes for Quantum and Radiological Science and Technology, 8-1 Umemidai, Kizugawa-shi, Kyoto 619-0215, Japan

[Atomic and Radiative Processes in High-Z Plasmas and their Applications in EUV Lithography and "Water Window" Imaging \(S21\)](#)

Bowen Li¹, Takeshi Higashiguchi², Takamitsu Otsuka^{2,5}, Hayato Ohashi³, Chihiro Suzuki⁴, Emma Sokell⁵, Padraig Dunne⁵, Yang li¹, Xiaokai Xu¹, Ximeng Chen¹, and Gerry O'Sullivan⁵

¹ *School of Nuclear Science and Technology, Lanzhou University, Lanzhou 730000, China*

² *Department of Advanced Interdisciplinary Sciences, Center for Optical Research & Education (CORE), and Optical Technology Innovation Center (OpTIC), Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585 Japan*

³ *Graduate School of Science and Engineering for Research, University of Toyama, Toyama, Toyama 930-8555, Japan*

⁴ *National Institute for Fusion Science (NIFS), Toki, Gifu 509-5292, Japan*

⁵ *School of Physics, University College Dublin, Belfield, Dublin 4, Ireland*

[Soft X-ray Spectroscopy of Dy, Er and Tm Ions Excited in Laser-Produced Plasmas \(S23\)](#)

John Sheil¹, Takeshi Higashiguchi², Domagoj Kos¹, Takanori Miyazaki^{1,2}, Fergal O'Reilly¹, Gerry O'Sullivan¹, Paul Sheridan¹, Emma Sokell¹, Chihiro Suzuki³ and Deirdre Kilbane¹

¹ *School of Physics, University College Dublin, Belfield, Dublin 4, Ireland*

² *Department of Electrical and Electronic Engineering, Faculty of Engineering and Center for Optical Research and Education (CORE), Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585, Japan*

³ *National Institute for Fusion Science, 322-6 Oroshi-cho, Toki 509-5292, Japan*

5:20 PM Break (20 Minutes)

5:40 PM Session 6: Poster Session

Session Chair:

Measurements and Numerical Simulations of Sn ion Stopping in Low-pressure H₂ Atmosphere (S25)

D. B. Abramenko^{1,2}, D. I. Astakhov^{2,3}, P. V. Kraynov^{1,4}, V. M. Krivtsun^{1,2}, V. Medvedev^{1,2,3}, and K. N. Koshelev^{1,2}

¹ RnD-ISAN/EUV Labs, Sirenevy Bulevard Str. 1, Troitsk, Moscow 108840, Russia.

² Institute for Spectroscopy RAS, Fizicheskaya str. 5, Troitsk, Moscow 108840, Russia

³ ISTEQ BV, High Tech Campus 9, Eindhoven, The Netherlands

⁴ Moscow Institute of Physics and Technology (State University), Institutskiy pereulok str. 9, Dolgoprudny, Moscow region 141701, Russia

Configuration Interaction Effects in Unresolved np⁶nd^{N+1}-np⁵nd^{N+2}+np⁶nd^Nnf¹ Transition Arrays; Contrasting Behaviour for n=4 and n=5" (S26) (Withdrawn)

Luning Liu, Deirdre Kilbane, Pdraig Dunne, John Sheil, Xinbing Wang and Gerry O'Sullivan

Modelling of hybrid pumping of nitrogen recombination laser (S34) (Withdrawn)

P. Vrba¹, M. Vrbova²

¹Institute of Plasma Physics, Czech Academy of Sciences, 182 00 Prague 8, CR,

²Czech Technical University, Faculty of Biomedical Engineering, 272 01 Kladno, CR

Expansion dynamics after laser-induced cavitation in liquid tin microdroplets (S44) First Place – Poster Session Award

D. Kurilovich^{1,2}, T. Pinto^{1,2}, R. Schupp¹, F. Torretti^{1,2}, J. Scheers^{1,2}, A. Stodolna^{1,2}, W. Ubachs^{1,2}, R. Hoekstra^{1,3}, S. Witte¹, O.O. Versolato¹

¹Advanced Research Center for Nanolithography (ARCNL), Science Park 110, 1098 XG Amsterdam, The Netherlands

²Department of Physics and Astronomy, and LaserLaB, Vrije Universiteit, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands

³Zernike Institute for Advanced Materials, University of Groningen, Nijenborgh 4, 9747 AG Groningen, The Netherlands

Development of a collective Thomson scattering system for laser-produced high-Z plasmas for soft X-ray light sources (S47)

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Yuta Sato¹, Syoichi Tsukiyama¹, Raimu Fukada¹, Kentaro Tomita¹, Kiichiro Uchino¹
¹ *Interdisciplinary Graduate School of Engineering and Sciences, Kyushu University, 6-1, Kasugakoen, Kasuga, Fukuoka 816-8580, JAPAN*

Ion Stage Velocity Evolution in CO₂-generated Laser Plasma Plumes (S48)

Frank McQuillan, Emma Sokell and Padraig Dunne
UCD Physics, Dublin, Ireland

EUV/SXR Spectroscopy of Ge Laser-Produced Plasma (S57)

O. Maguire, D. Kos, E. Sokell
Atomic, Molecular and Plasma (Spec) group, School of Physics, University College Dublin, Belfield Dublin 4 Ireland

Colliding Laser Produced Plasmas Analysis: Fast Imaging and Spectroscopic Study (S58)

Domagoj Kos^{1,2}, O. Maguire¹, F. O'Reilly¹, P. Dunne¹, E. Sokell¹
¹*School of Physics, University College Dublin, Belfield, Dublin 4, Ireland*
²*Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Brehova 7, 511519 Praha 1, Czech Republic*

High-brightness Broadband Light Source for Various Industrial Applications (S64) (Commercial Poster)

Samir Ellwi^{1,2}
1. RnD-ISAN/EUV Labs, Troitsk, 108840 Russia
2. ISTEQ, 5656 AG Eindhoven

Laboratory Tomographic Microscopy with Compact Plasma based Extreme ultraviolet and Soft X-ray Sources (S74)

Second Place – Poster Session Award

Daniel Vicario¹, Alexander von Wezyk², Klaus Bergmann², Larissa Juschkin¹
¹*RWTH Aachen University, Chair for Experimental Physics of EUV, JARA-FIT, Steinbachstr. 15, 52074 Aachen, Germany*
²*Fraunhofer-Institute for Laser Technology, Steinbachstr. 15, 52074 Aachen, Germany*

An Extreme Ultraviolet Monochromator for use with a Laser Produced Plasma Source (S86) (Withdrawn)

Carmen Vela Garcia, Emma Sokell, Padraig Dunne & Fergal O'Reilly
UCD School of Physics, University College Dublin, Belfield, Dublin 4, Ireland

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A compact, desk-top near edge soft X-ray absorption fine structure spectroscopy system based on a laser plasma double stream gas puff target source (S77)

M. Duda², P. Wachulak¹, A. Bartnik¹, A. Sarzyński¹, Ł. Węgrzyński¹, M. Nowak¹, H. Fiedorowicz¹, L.Pina² and A. Jancarek²

¹ *Institute of Optoelectronics, Military University of Technology, 2 Kaliskiego Str., 00-908 Warsaw, Poland*

² *Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czechia*

Commercial Posters

EUV Light Source Development at Energetiq (SC1)

Matthew J. Partlow, Stephen F. Horne, Donald K. Smith, Matthew M. Besen, Paul A. Blackborow, Deborah S. Gustafson
Energetiq

Laser Drive Light Source from Energetiq (SC2)

Huiling Zhu, Stephen F. Horne, Donald K. Smith, Matthew M. Besen, Paul A. Blackborow, Deborah S. Gustafson, Matthew J. Partlow
Energetiq

Wednesday, November 8, 2017

(George Moore Auditorium, UCD Campus, Dublin)

9:15 AM Announcements and Introductions

Announcements (Intro-2)

Padraig Dunne
UCD

9:20 AM Session 7: Keynote Session -2

Session Chair: Padraig Dunne (UCD)

[Imaging Biological Cells using Soft X-ray Tomography \(S2\) \(Keynote Presentation\)](#)

Carolyn Larabell
University of California San Francisco School of Medicine and
Lawrence Berkeley National Laboratory

10:00 AM Session 8: EUV Metrology Sources

Session Chairs: Klaus Bergmann (ILT) and Samir Ellwi (ISTEQ)

[Plasma based XUV Sources for Metrology Applications \(S53\) \(Invited\)](#)

Klaus Bergmann, Alexander von Wezyk, Jochen Vieker
Fraunhofer Institute for Laser Technology – ILT, Steinbachstr. 15, 52074 Aachen,
Germany

[Characterization of Laser-assisted and laser-driven EUV sources for Metrology Applications \(S51\) \(Invited\)](#)

Yusuke Teramoto¹, Bárbara Santos¹, Guido Mertens¹, Margarete Kops¹, Ralf Kops¹,
Alexander von Wezyk², Klaus Bergmann², Hironobu Yabuta³, Akihisa Nagano³,
Takahiro Shirai³, Yoshihiko Sato³, Kunihiko Kasama³

¹BLV Licht- und Vakuumtechnik GmbH, Steinbachstrasse 15, 52074 Aachen,
Germany

²Fraunhofer ILT, Steinbachstrasse 15, 52074 Aachen, Germany

³Ushio Inc., 1-90 Komakado, Gotemba 412-0038, Japan

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[Actinic Light Source based on LPP for HVM Mask Inspection Applications \(S55\) \(Invited\)](#)

Konstantin Koshelev^{1,2}, Alexander Vinokhodov¹, Oleg Yakushev¹, Alexey Yakushkin¹, Dimitri Abramenko¹, Alexander Lash¹, Mikhail Krivokorytov^{1,2}, Yuri Sidelnikov², Vladimir Ivanov², Vladimir Krivtsun², Vyacheslav Medvedev¹, Denis Glushkov³, Pavel Seroglazov³, Samir Ellwi³

1 – RnD-ISAN/EUV Labs, Troitsk, 108840 Russia;

2 – Institute for Spectroscopy RAS, Troitsk, 108840 Russia;

3 – ISTEQ, 5656 AG Eindhoven

[Laser Induced Shockwave Droplet Breakup Dynamics \(S52\)](#)

Duane Hudgins, Alex Nieland and Reza S. Abhari

Laboratory for Energy Conversion, Swiss Federal Institute of Technology Zurich (ETHZ), Switzerland

[A High-brightness Accelerator-based EUV source for EUV Actinic Mask Inspection \(S54\) \(Invited\)](#)

Y. Ekinci, T. Garvey, A. Streun, A. Wrulich and L. Rivkin

Paul Scherrer Institute, Villigen, Switzerland

[Compact X-ray Sources and Applications for Semiconductor Metrology \(S56\) \(Invited\)](#)

R. Joseph Kline

National Institute of Standards and Technology, USA

12:00 PM Break (15 Minutes)

12:15 PM Session 9: Broad-band EUV Sources

Session Chairs: Ilya Bezel (KLA-Tencor) and Stephen Horne (Energetiq)

[Industry Requirements for Broad Band EUV Sources for Wafer Inspection Applications \(S61\)](#)

Vivek Bakshi

EUV Litho, Inc.

[High Power Laser-Sustained Plasma Light Sources for KLA-Tencor Broadband Wafer Inspection Tools \(S63\) \(Invited\)](#)

I. Bezel, M. Derstine, K. Gross, A. Shchemelinin, J. Szilagy, and D. Shortt
Technology Group, WIN Division, KLA-Tencor Corp, One Technology Drive, Milpitas, CA 95035

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[The Electrode-less Z-Pinch as a Metrology Source in the 40-50 nm range \(S62\) \(Invited\)](#)

Stephen F. Horne, Matthew M. Besen, Paul A. Blackborow, Deborah Gustafson, Matthew J. Partlow, Donald K. Smith
Energetiq Technology Inc., 7 Constitution Way, Woburn MA 01801

1:00 Lunch (90 Minutes)

2:30 PM Session 10: EUV and XUV Applications

Session Chairs: Fergal O'Reilly (UCD) and Larissa Juschkin (RWTH Aachen University)

[Soft X-ray Microscopes for Biology: The Source \(S71\) \(Invited\)](#)

Gerry McDermott, Ph.D.
Department of Anatomy, UCSF and Lawrence Berkeley National Laboratory

[Chromatin Reorganization during Viral Infection \(S72\) \(Invited\)](#)

Vesa Aho¹, Markko Myllys¹, Carolyn A. Larabell^{2,3} and Maija Vihinen-Ranta⁴
1. Department of Physics and Nanoscience Center, University of Jyväskylä, Jyväskylä, Finland

2. Department of Anatomy, University of California San Francisco, San Francisco, California, USA

3. Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, California, USA

4. Department of Biological and Environmental Science, University of Jyväskylä, Jyväskylä, Finland

[Exploring the Soft X-ray Radiance of Laser Plasmas \(S73\) \(Invited\)](#)

Fergal O'Reilly and Gladson Joseph
UCD School of Physics, University College Dublin, Belfield, Dublin 4, Ireland.

[Relativistic Plasma Control using Two-colour Fields \(S75\) \(Invited\)](#)

Brendan Dromey¹, Mark Yeung¹, Sergey Rykovanov², Jana Bierbach^{2,3}, Lu Li¹, E. Eckner³, Stephan Kuschel^{2,3}, Abel Woldegeorgis^{2,3}, Christian Rödel^{2,3,4}, Alexander Sävert³, Gerhard G. Paulus^{2,3}, Mark Coughlan¹, and Matthew Zepf^{1,2,3}

¹ Department of Physics and Astronomy, Queen's University Belfast, Belfast, UK

² Helmholtz Institute Jena, Fröbelstieg 3, Jena, Germany

³ Institut für Optik und Quantenelektronik, Friedrich-Schiller-Universität Jena, Max-Wien-Platz 1, Jena, Germany

⁴ SLAC National Accelerator Laboratory, 2575 Sand Hill Road, Menlo Park, California, USA

Spectroscopic EUV reflectometry for characterization of thin films systems and determination of optical constants (S76) (Invited)

Larissa Juschkin^{1,2}, Maksym Tryus¹, Konstantin Nikolaev³, Igor Makhotkin³, Daniel Wilson², Lidia Kibkalo², Jürgen Schubert², Angelo Giglia⁴, Piergiorgio Nicolosi⁵, and Serhiy Danylyuk⁶

¹ RWTH Aachen University, Chair for Experimental Physics of EUV, JARA-FIT, Germany

² Forschungszentrum Jülich GmbH, Peter Grünberg Institut 9, JARA-FIT, Germany

³ University of Twente, Faculty of Science and Technology, Enschede, The Netherlands

⁴ CNR - Istituto Officina Materiali, Trieste, Italy

⁵ Università degli Studi di Padova, Dipartimento di Ingegneria dell'Informazione, Italy

⁶ RWTH Aachen University, Chair for Technology of Optical Systems, JARA-FIT, Germany

4:10 PM Break (20 Minutes)

4:30 PM Session 11: Optics and Metrology

Session Chairs: Eric Louis (Univ. Twente) and V V Medvedev (ISAN)

REFURBISHMENT OF COLLECTOR MIRRORS FOR WATER WINDOW MICROSCOPY (S81) (Withdrawn)

T. Feigl, H. Pauer, M. Perske, T. Fiedler, P. Naujok
optiX fab GmbH, Hans-Knöll-Str. 6, 07745 Jena, Germany

F. Scholze, C. Laubis

Physikalisch-Technische Bundesanstalt, Abbestr. 2-12, 10587 Berlin, Germany

EUVL Optics for Free Electron Laser Sources: Damage Threshold Studies and the Use of Adjusted Wavelengths (S82) (Invited)

Eric Louis

MESA+ Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE, Enschede, The Netherlands

Novel Spectrometers for Broad-band Characterization of EUV-Emitting Plasmas (S83)

V V Medvedev

RnD-ISAN, Promyshlennaya 1A, Troitsk, Moscow, Russia

EUV Labs, Sirenevy bulevard 1, Troitsk, Moscow, Russia

ISTEQ BV, High Tech Campus 9, Eindhoven, The Netherlands

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Broadband Spectral Characterization of EUV light Sources with a Transmission Grating Spectrometer (S85)

Muharrem Bayraktar^{1*}, Fei Liu², Bert Bastiaens³, Caspar Bruineman⁴ and Fred Bijkerk¹

¹ *Industrial Focus Group XUV Optics, MESA + Institute for Nanotechnology, University of Twente, The Netherlands*

² *ASML Netherlands B.V., De Run 6501, 5504 DR Veldhoven, The Netherlands*

³ *Laser Physics and Nonlinear Optics, MESA + Institute for Nanotechnology, University of Twente, The Netherlands*

⁴ *Scientec Engineering, The Netherlands*

5:50 PM Announcements

2017 Source Workshop Summary

Vivek Bakshi
EUV Litho, Inc.

Workshop Adjourned and Depart for off-site Dinner

