2014 International Workshop on EUV and Soft X-Ray Sources

November 3-6, 2014

Dublin ▪ Ireland

Workshop Proceedings

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WORKSHOP Proceedings

2014 International Workshop on EUV and Soft X-Ray Sources

November 3-6, 2014, Dublin, Ireland

Tuesday, November 4, 2014 (George Moore Auditorium)

8:30 AM Announcements and Introductions

Introduction and Announcements (Intro-1)

Vivek Bakshi, EUV Litho, Inc., USA

8:40 AM Session 1: Keynote Session -1

Session Chair: Padraig Dunne

EUVL for HVM: Progress and Risks (S1)

Mark Phillips
Intel Corporation

One Hundred Watt Class EUV Source Development for HVM Lithography (S2)

Hakaru Mizoguchi, Hiroaki Nakarai, Tamotsu Abe, Takeshi Ohta, Krzysztof M Nowak, Yasufumi Kawasuji, Hiroshi Tanaka, Yukio Watanabe, Tsukasa Hori, Takeshi Kodama, Yutaka Shiraishi, Tatsuya Yanagida, Georg Soumagne, Tsuyoshi Yamada, Taku Yamazaki, Shinji Okazaki and Takashi Saitou
Gigaphoton Inc. Hiratsuka facility: 3-25-1 Shinomiya Hiratsuka Kanagawa, 254-8567, JAPAN

Awards and Announcements – Padraig Dunne (UCD)

Break 10:00 AM

10:20 AM Session 2: HVM EUV Sources

Session Co-Chairs: Wim Zande (ASML) and Stephen Horne (Energetiq)

EUV Sources for HVM Scanners: Status Update and Roadmap (Tentative title) (Invited) (S29)

Wim van der Zande
ASML

Measurement of CO_2 laser absorption by tin plasma as a 13.5 nm EUV light source (S23)

H. Nishimura, H. Matsukuma, K. Yoshida, T. Hosoda, A. Yogo, N. Tanaka, S. Fujioka, K. Nishihara, A. Sunahara*, and T. Somekawa*
Institute of Laser Engineering, Osaka University, Japan
* *Institute for Laser Technology, Japan*

Droplet-based EUV LPP Source for High Volume Metrology (S30)
Bob Rollinger, Nadia Gambino, Andrea Giovannini, Duane Hudgins, Alexander Sanders and Reza S. Abhari
Laboratory for Energy Conversion, Swiss Federal Institute of Technology Zurich (ETHZ), Switzerland

Femtosecond laser pre-pulse technology for LPP EUV source (S72)

Alexander Vinokhodov[1], Vladimir Krivtsun[1,2], Mikhail Krivokorykov[1],Yury Sidelnikov[1,2], Sergey Chekalin[2], Victor Kompanets[2] , Alexey Melnikov[2], Konstantin Koshelev[1,2]
[1] *EUV Labs/RnD ISAN, Moscow, Russia,*
[2] *Institute for Spectroscopy RAS, Moscow, Russia*

Evolution of the Energetiq Electrodeless Z-Pinch™source – What worked, and what didn't… (Invited) (S73)

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

Source Requirements for Next Generation AIMS EUV (Invited) (S94) (10 minutes short presentation)
Udo Dinger
Carl Zeiss

Metrology source requirements for KLA Actinic Inspection Tool (Invited) (S93) (10 minutes short presentation)
Oleg Khodykin
KLA-Tencor

Metrology Source Requirements for Actinic Mask Blank Inspection (Invited) (S95) (10 minutes short presentation)
Stephen F. Horne
Energetiq

Lunch 12:00 PM

1:00 PM Session 3: Modeling

Session Chair: Gerry O'Sullivan (UCD)

Computer simulation tools for plasma-based sources of EUV radiation (Invited) (S35)

V. V. Medvedev[1,2], V. G. Novikov[1,3], V. V. Ivanov[1,2], I. Yu. Vichev[1,3], M.M. Basko[1,3], V. S. Konovalov[1,3], A. D. Solomyannaya[1,3], A. S. Grushin[1,3], , A. M. Yakunin[4], A. Bratchenia[4], D. Labetski[4], K. Feenstra[4] and K. N. Koshelev[1,2]
[1] RnD-ISAN/EUV Labs, Moscow, Troitsk, Russia
[2] Institute for Spectroscopy RAS, Moscow, Troitsk, Russia
[3] Keldysh Institute of Applied Mathematics RAS, Moscow, Russia
[4] ASML Netherlands, Veldhoven, The Netherlands.

Hydrodynamics modeling of the dynamics of Sn droplet target for the EUV source (S31)

Akira Sasaki
Kansai Photon Science Institute, Japan Atomic Energy Agency, Kyoto, Japan

Radiation hydrodynamics of tin targets for laser-plasma EUV sources (S36)

Mikhail Basko
KIAM, Moscow, Russia

2:00 PM Session 4: FEL-1

Session Co-Chairs: Akira Endo (HiLase and Waseda University) and Hironari Yamada (Ritsumeikan University)

Expectation and challenges of higher NA EUV lithography (Invited) (S57)

Takayuki UCHIYAMA
Lithography Process Development Department, Center for Semiconductor Research and Development, TOSHIBA Corporation

Optimization of high average power FEL beam for EUV lithography application (Invited) (S51)

Akira Endo[1,2], Kazuyuki Sakaue[1], Masakazu Washio[1] and Hakaru Mizoguchi[3]
[1]Research Institute for Science and Engineering, Waseda University, [2]HiLase Center, [3]Gigaphoton Inc.

High efficiency 10 kW class FEL for EUV lithography (Invited) (S52)

Alex Murokh
RadiaBeam Technologies, LLC, USA

Development of Superconducting Accelerator with ERL for EUV-FEL (Invited) (S55)

Eiji Kako
KEK, High Energy Accelerator Research Organization, JAPAN

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

3:40 PM Session 5: FEL-2

Session Co-chairs: Alex Murokh (RadiaBeam Technologies) and Mikhail Yurkov (DESY)

Accelerator technologies for EUV or Soft X-ray Lithography (S60) (Invited – Review Talk)
Hironari Yamada
Ritsumeikan University, Japan

The FERMI free electron laser soft – x-ray user facility (S54) (Invited)

E. Allaria
FERMI commissioning team

Design of High-Power Free-Electron Lasers for EUV Lithography Applications (S56) (Invited)

Ryoichi Hajima [1), 2)]
1) Japan Atomic Energy Agency, Tokai, Naka, Ibaraki 3191195 Japan
2) High Energy Accelerator Research Organization, Tsukuba, Ibaraki 3050801 Japan

Status, perspectives, and lessons from FLASH (S58) (Invited)

E. A. Schneidmiller, M. V. Yurkov
Deutsches Elektronen Synchrotron (DESY), Hamburg, Germany

5:30 PM – 6:45 PM Session 6: Poster Session (Poster Listings – Next Page)

7:00 PM Depart for Off-site Dinner (Marion Hotel)

End of Day 2

5:30 PM Session 6: Poster Session

Session Chair: Padraig Dunne (UCD)

Topic: EUV Sources for HVM

Efficient EUV sources by short CO_2 laser-produced plasmas (S21)

Reiho Amano[1], Thanh Hung Dinh[1], Masato Kawasaki[1], Atsushi Sasanuma[1], Yuhei Suzuki[1], Takeshi Higashiguchi[1], and Taisuke Miura[2]

[1]Department of Advanced Interdisciplinary Sciences, Center for Optical Research & Education (CORE), Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585 Japan
[2]HiLASE Centre, Institute of Physics ASCR, v.v.i., Za Radnici 828, 25241 Dolni Brezany, Czech Republic

A microplasma high-brightness EUV source at 13.5 nm (S22)

Goki Arai[1], Hiroyuki Hara[1], Yuhei Suzuki[1], Thanh Hung Dinh[1], and Takeshi Higashiguchi[1]
[1]Department of Advanced Interdisciplinary Sciences, Center for Optical Research & Education (CORE) Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585 Japan

Long-term Confinement of Dense Plasma Column by Magnetic Field of Vertical Current Loop in Discharge Plasma of EUV Source (S25)

N. A. Azarenkov, Ie. V. Borgun, V. I. Maslov, D. L. Ryabchikov, A. F. Tseluyko, I. P. Yarovaya
Karazin Kharkov National University, Kharkov, Ukraine

Time resolved Imaging & EUV spectroscopy studies on laser-assisted vacuum-arc EUV source (S26)

Girum Abebe Beyene[1,3], Isaac Tobin[2], Larissa Juschkin[3], Padraig Dunne[1], Emma Sokell[1] , Gerry O'Sullivan[1], and Fergal O'Reilly[1]
[1]School of Physics, University College Dublin, Ireland,
[2]School of Physics, Trinity College Dublin, Dublin 2, Ireland
[3]Department of Physics, RWTH Aachen University, Aachen, Germany

Study on Extreme Ultraviolet Light Source Radiated by Capillary Discharge Produced Xe Plasma with Repetition Rate of 1kHz (S27)

Zhao Yongpeng[1], Xu Qiang[2,1], Li Qi[1], Wang Qi[1]
[1]National Key Laboratory of Tunable Laser Technology, Harbin Institute of Technology, Harbin 150080, China
[2]College of science, Northeast forestry university, Harbin 150040, China

EUV contamination control at TNO (S28)

Edwin te Sligte, Arnold Storm, Norbert Koster, Jacques van der Donck, Michel van Putten, Jetske Stortelder, Herman Bekman, Daan van Eijk, Rob Ebeling, Freek Molkenboer, Véronique de Rooij, Jacqueline van Veldhoven, Jochem Janssen
TNO, Delft, The Netherlands

LPP Light Source for Metrology and Inspection Applications (S71)

Nadia Gambino, Bob Rollinger, Duane Hudgins, Alexander Sanders, Markus Brandstätter and Reza S. Abhari

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

Topic: Modeling

Modeling of target deformations due to pre-pulse with debris analysis (S32)

I. Yu. Vichev[1,3], V. G. Novikov[1,3], M.M. Basko[1,3], V.V. Ivanov[1,2], V.V. Medvedev[1,2]
[1] RnD-ISAN, Troitsk, 142190 Russia
[2] Institute of Spectroscopy RAS, Troitsk, 142090 Russia
[3] Keldysh Institute of Applied Mathematics RAS, Moscow, 125047 Russia

Radiation hydrodynamic simulation of a high-brightness 13.5-nm EUV microplasma (S33)

Hiroyuki Haya[1], Goki Arai[1], Takanori Miyazaki[1], Thanh-Hung Dinh[1], Takeshi Higashiguchi[1], and Atsushi Sunahara[2]
[1]Department of Advanced Interdisciplinary Sciences, Center for Optical Research & Education (CORE), Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585 Japan
[2]Institute for Laser Technology, 2-6 Yamada-Oka, Suita, Osaka 565-0871 Japan

Plasma source modeling accounting non-LTE radiation transport and level kinetics in-line with gasdynamics (S34)

D.A. Kim, V.G. Novikov, G.V. Dolgoleva, A.D. Solomyannaya
Keldysh Institute of Applied Mathematics RAS, Moscow, Russia

Model for plasma debris mitigation by gaseous atmosphere (S37)

V. Konovalov
ISAN, Moscow, Russia

Validation of EUV source models against experimental simulations (S39)

V. Grushin
ISAN, Moscow, Russia

3D SIMULATION OF SHIFTED LASER PULSE COUPLING TO TIN TARGET (S40)

I.P. Tsygvintsev, A.Yu.Krukovskiy, V.G. Novikov
KIAM RAS, Moscow, Russia

Topic: FEL

Development of High Repetition Rate Seed Pulse at 324nm for EUV-FEL using Picosecond Thin-disk Regenerative Amplifier (S53)

Taisuke Miura[1], Michal Chyla[1,2], Martin Smrž[1], Siva Sankar Nagisetty[1,2], Patricie Severová[1,2], Ondřej Novák[1], Hana Turčičová[1], Pawel Sikocinski[1,2], Akira Endo[1,3], and Tomáš Mocek[1]
[1]HiLASE Centre, Institute of Physics ASCR, Za Radnicí 828, 252 41 Dolní Břežany, Czech Republic
[2]Czech Technical University in Prague, Břehová 7, 115 19, Prague, Czech Republic
[3]Waseda University, 17 Kikui-cho Shinjuku Tokyo, Japan

Optimization of a high efficiency FEL amplifier (S59)

E.A. Schneidmiller, M.V. Yurkov
Deutsches Elektronen Synchrotron (DESY), Hamburg, Germany

Topic: Optics

Controlling interface chemistry in 6 nm La/B multilayer optics (S84)

Dmitry Kuznetsov, Marko Sturm, Robbert van de Kruijs, Andrey Yakshin, Eric Louis and Fred Bijkerk
MESA⁺ Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands

Topic: Soft X-ray Sources and Applications

Quasi-Moseley's law for UTA spectra in high-Z highly ion charge states for high power EUV & soft x-ray sources (S43)

Yuhei Suzuki[1], Goki Arai[1], Takanori Miyazaki[1], Thanh-Hung Dinh[1], and Takeshi Higashiguchi[1]
[1]Department of Advanced Interdisciplinary Sciences, Center for Optical Research & Education (CORE), Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585 Japan

Nanometer optical coherence tomography using broadband extreme ultra violet light (S44)

S. Fuchs[1,2], C. Rödel[1,2], M. Wünsche[1,2], J. Biedermann[1], U. Zastrau[1], V. Hilbert[1], E. Förster[1], G. G. Paulus[1,2]
[1] Institute of Optics and Quantum Electronics, Friedrich Schiller University Jena, Germany
[2] Helmholtz Institute Jena, Germany

Comparison of Laser Produced Plasma and Discharge Produced Plasma as a Source for Soft X-Ray Microscopy (S48)

T. Parkman[1], S. Vondrova[1], M. Nevrkla[2], P. Bruza[1], M. Vrbova[1]
[1]Czech Technical University in Prague, Faculty of Biomedical Engineering, 272 01 Kladno, Czech Republic
[2]Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, 180 00 Prague 8, Czech Republic

Laser-Produced Plasma Spectroscopy of Medium to High-Z Elements in the 2 to 10 nm Spectral Region (S49)

Elaine Long[1], John Sheil[1], Elgiva White[1], Chihiro Suzuki[2], Padraig Dunne[1], Fergal O'Reilly[1] & Gerry O'Sullivan[1]
[1]UCD School of Physics, University College Dublin,Belfield, Dublin 4, Ireland.
[2]National Institute for Fusion Science, 322-6 Oroshi-cho, Toki 509-5292, Japan

Investigation of Laser-Produced Plasmas of Mo, Ru, Rh and Pd in the 2.4 nm to 13 nm Spectral Region (S50)

Ragava Lokasani[1,2], Elaine Long[1], Girum Beyene[1], Patrick Hayden[1], Padraig Dunne[1], Jiri Limpouch[2], Akira Endo[3], Fergal O'Reilly[1] &Gerry O'Sullivan[1]
1) UCD School of Physics, University College Dublin, Belfield, Dublin 4, Ireland.
2) Czech Technical University, Prague, Czech Republic
3) HiLASE Project, Prague, Czech Republic

Characteristics of soft x-ray emission from optically thin high-*Z* plasmas in Large Helical Device (S92)

Hayato Ohashi[1], Takeshi Higashiguchi[2], Yuhei Suzuki[2], Goki Arai[2], Bowen Li[3], Padraig Dunne[4], Gerry O'Sullivan[4], Hiroyuki A. Sakaue[5], Daiji Kato[5], Izumi Murakami[5], Naoki Tamura[5], Shigeru Sudo[5], Fumihiro Koike[6], and Chihiro Suzuki[5]
[1]Graduate School of Science and Engineering for Research, University of Toyama, Toyama, Toyama 930-8555, Japan
[2]Department of Advanced Interdisciplinary Sciences and Center for Optical Research and Education (CORE), Utsunomiya University, Utsunomiya, Tochigi 321-8585, Japan
[3]School of Nuclear Science and Technology, Lanzhou University, Lanzhou, 730000, China
[4]School of Physics, University College Dublin, Belfield, Dublin 4, Ireland
[5]National Institute for Fusion Science, Toki, Gifu 509-5292, Japan
[6]Faculty of Science and Technology, Sophia University, Chiyoda, Tokyo 102-8554, Japan

Topic: Water-window Microscopy

Possibility of high-*Z* plasma water window sources (S61)

Takanori Miyazaki[1], Yuhei Suzuki[1], Thanh Hung Dinh[1], and Takeshi Higashiguchi[1]
[1]Department of Advanced Interdisciplinary Sciences, Center for Optical Research & Education (CORE), Utsunomiya University, Yoto 7-1-2, Utsunomiya, Tochigi 321-8585 Japan

Wednesday, November 5, 2014

8:30 AM Announcements

Introduction and Announcements (Intro-2)
Vivek Bakshi, EUV Litho, Inc.

8:40 AM Session 7: Keynote Session - 2

Session Chair: Padraig Dunne (UCD)

Tomographic Imaging with Soft X-rays (S3)

Carolyn Larabell
University of California, San Francisco

Brief Presentation (5 minutes) –UCD Physics Overview (S99) Padraig Dunne, UCD

9:20 AM Session 8: Optics

Session Co-chairs: Torsten Feigl (optiX fab) and Eric Louis (DIFFER)

Multilayer collector mirror for DPP EUV metrology sources (S82) (Invited)

Torsten Feigl[a], Marco Perske[a], Hagen Pauer[a], Tobias Fiedler[a], Christian Laubis[b], Frank Scholze[b]
[a]optiX fab GmbH, Hans-Knöll-Str.6, 07745 Jena, Germany
[b]Physikalisch-Technische Bundesanstalt, Abbestr. 2-12, 10587 Berlin, Germany

Spectral purity enhancement for the EUV Lithography Systems (S83) (Invited)

Eric Louis[a,b], Qiushi Huang[a,b], Slava Medvedev[a,b], V. M. Krivtsun[c], Meint de Boer[a], *Robbert van de Kruijs[a,b], and Fred Bijkerk[a,b]*
[a] MESA+ Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE, Enschede, The Netherlands
[b] FOM Institute DIFFER - Dutch Institute for Fundamental Energy Research, P.O. Box 1207, 3430 BE, Nieuwegein, The Netherlands
[c] Institute for Spectroscopy RAS, Fizicheskaya Str. 5, Troitsk, Moscow Region, 142190 Russia

Possible beam expander and homogenizer for 13.5 nm applications (S81) (Invited)

Ladislav Pina
Czech Technical University in Prague, CR

Damage to optics under irradiations with the intense EUV FEL pulses (S85) (Invited)

Ryszard Sobierajski[1], Eric Louis[2]
Institute of Physics, Polish Academy of Sciences, Al. Lotników 32/46, PL-02-668 Warsaw, Poland
Universiteit Twente, TNW-XUV Optics, Drienerlolaan 5, 7522 NB Enschede, The Netherlands

10:40 AM Break (20 minutes)

11:00 AM Session 9: Soft X-ray and Applications

Session Co-chairs: Ladislav Pena (Czech Technical University) and Larrisa Jushkin (RWTH Aachen University)

A New Setup for Observation of Forbidden Lines from Metastable Ions produced in Charge Exchange Collisions (S41)

Hajime Tanuma[A] , Naoki Numadate[B], Hirofumi Shimaya[A] , Nubuyuki Nakamura[C], Kunihiro Okada[B]
[A] Department of Physics, Tokyo Metropolitan University, 1-1 Minani-Ohsawa, Hachioji, Tokyo 192-0397, Japan
[B] Department of Physics, Sophia University, 7-1 Kioicho, Chiyoda, Tokyo 102-8554, Japan
[C] Institute for Laser Science, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-0021, Japan

EUV Ablation of PPEES: Process and Critical Factors (S42)

C. Liberatore[1,2], A. Bartnik[4], K. Mann[3], M. Müller[3], L. Pina[2], L. Juha[1], J. J. Rocca[5], A. Endo[1], T. Mocek[1]
[1]HiLASE Project, Institute of Physics ASCR, Dolní Břežany, Czech Republic;
[2]Czech Technical University, Prague, Czech Republic;
[3]Institute of Optoelectronics (IOE) ,Military University of Technology, Warsaw, Poland;
[4]Laser Laboratorium Göttingen (LLG), Göttingen, Germany;
[5]Department of Electrical and Computer Engineering, Colorado State University, Fort Collins, CO 80523, USA

Coherent Extreme ultra violet Light Sources using Highly Efficient High Harmonic Generation (S45)

M. Wünsche*[1,2], A. Hage[3,4], M. Taylor[4], M. Yeung[2,4], C. Rödel[1,2], B. Landgraf[1,2], A. Willner[3], M. J. Prandolini[2], M. Schulz[3], T. Gangolf[1], S. Fuchs[1,2], H. Höppner[3], R. Riedel[2], B. Dromey[4], F. Tavella[2], C. Spielmann[1], M. Zepf[1,2,4], G. G. Paulus[1,2]

[1] Institute of Optics and Quantum Electronics, Friedrich Schiller University Jena, Germany
[2] Helmholtz Institute Jena, Germany
[3] Deutsches Elektronen Synchrotron, Germany
[4] Queen's University Belfast, United Kingdom

Laser Plasma Monochromatic Soft X-ray Source Using Nitrogen Gas Puff Target (S47)

M. Vrbova[1], P. Vrba[2], S.V. Zakharov[3], V.S. Zakharov[4], M. Müller[5], D. Pánek[1], T. Parkman[1]
[1]Czech Technical University, Faculty of Biomedical Engineering, 272 01 Kladno, CR,
[2]Institute of Plasma Physics, Czech Academy of Sciences, 182 00 Prague 8, CR,
[3]NaextStream sas, Buc, France, 4KIAM RAS, Moscow, Russia, 5LLG, D-37077 Göttingen

Source Radiance Requirements for High Resolution Imaging and Interference Techniques (S91) (Invited)

Larissa Juschkin
RWTH Aachen University, Germany

12:40 PM Lunch

1:40 PM Session 10: Water Window Microscopy

Sources for Water Window Imaging (S64) (Invited Review Talk)

Gerry O'Sullivan[a], Padraig Dunne[a], Paddy Hayden[a], Bowen Li[ab], Ragava Lokasani[ac], Elaine Long[a], Hayato Ohashi[d], Fergal O'Reilly[a], John Sheil[a], Emma Sokell[a], Chihiro Suzuki[e], Elgiva White[a] and Takeshi Higashiguchi[f]
[a]*School of Physics, University College Dublin, Belfield, Dublin 4, Ireland*
[b]*School of Nuclear Science and Engineering, Lanzhou University, Lanzhou 730000, China*
[c]*Czech Technical University, Brehova 7,Czech Republic*
[d]*University of Toyama,3190 Gofuku, Toyama, Toyama 930-8555, Japan*
[e]*National Institute for Fusion Science, 322-6 Oroshi-cho, Toki 509-5292, Japan*
[f]*Utsunomiya University, 7-1-2 Yoto, Utsunomiya 321-8585, Japan*

Water window radiation from 40 kA Z-pinching capillary discharge plasma (S62)

Michal Nevrkla and Alexandr Jančárek
Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Czech Republic

3D Characterization of Chromatin Structure (S65) (Invited)

M Myllys[1], C Larabell[2], J Timonen[1] and M. Vihinen-Ranta[1]
[1] *University of Jyväskylä, Department of Physics, Jyväskylä, Finland*
[2] *Department of Anatomy, University of California, San Francisco, USA*
[3] *Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, USA*

Soft X-ray Source for High-speed Soft X-ray Tomography of Cryo-frozen Cells (S63)

Fergal O'Reilly, Kenneth Fahy, Padraig Dunne, Niall Kennedy, Paul Sheridan
School of Physics, University College Dublin, Belfield, Dublin 4, Ireland

3:10 PM Workshop Summary and Announcements

Workshop Summary and Announcements (Summary)
Vivek Bakshi, EUV Litho, Inc.

3:30 PM Workshop Adjourned


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