PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 7448

, "Front Matter: Volume 7448," Proc. SPIE 7448, Advances in X-Ray/EUV Optics and Components IV, 744801 (28 September 2009); doi: 10.1117/12.847193

SPIE.

Event: SPIE Optical Engineering + Applications, 2009, San Diego, California, United States

PROCEEDINGS OF SPIE

Advances in X-Ray/EUV Optics and Components IV

**Ali M. Khounsary
Christian Morawe
Shunji Goto**
Editors

**3–5 August 2009
San Diego, California, United States**

Sponsored and Published by
SPIE

Volume 7448

Proceedings of SPIE, 0277-786X, v. 7448

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Advances in X-Ray/EUV Optics and Components IV*, edited by Ali M. Khounsary, Christian Morawe, Shunji Goto, Proceedings of SPIE Vol. 7448 (SPIE, Bellingham, WA, 2009) Article CID Number.

ISSN 0277-786X

ISBN 9780819477385

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) • Fax +1 360 647 1445

SPIE.org

Copyright © 2009, Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/09/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

vii Conference Committee

SESSION 1 METROLOGY AND APPLICATIONS

- 7448 02 **Methods to improve the accuracy of the surface reconstruction with a Fizeau interferometer** [7448-28]
J. Vidal, J. Nicolas, ALBA Synchrotron Light Source Facility (Spain); J. Campos, Univ. Autònoma de Barcelona (Spain)
- 7448 03 **Binary pseudo-random gratings and arrays for calibration of the modulation transfer function of surface profilometers: recent developments** [7448-02]
S. K. Barber, Lawrence Berkeley National Lab. (United States); P. Soldate, Rensselaer Polytechnic Institute (United States); E. H. Anderson, R. Cambie, S. Marchesini, W. R. McKinney, Lawrence Berkeley National Lab. (United States); P. Z. Takacs, Brookhaven National Lab. (United States); D. L. Voronov, V. V. Yashchuk, Lawrence Berkeley National Lab. (United States)
- 7448 04 **High-precision profile measurement of a small radius lens by surface gradient integrated profiler** [7448-03]
Y. Ueno, Osaka Univ. (Japan); Y. Higashi, High Energy Accelerator Research Organization (Japan); S. Tachibanada, J. Uchikoshi, Osaka Univ. (Japan); T. Kume, K. Enami, High Energy Accelerator Research Organization (Japan); H. Uchimura, K. Tanaka, Toshiba Machine Co., Ltd. (Japan); K. Endo, Osaka Univ. (Japan)
- 7448 05 **Modeling of heat-bump formation in x-ray optics under SR beams** [7448-05]
P. Revesz, A. Kazimirov, J. J. Savino, C. J. MacGahan, Cornell Univ. (United States); E. L. Windisch, Wayne State Univ. (United States)

SESSION 2 MIRRORS AND APPLICATIONS

- 7448 06 **Improved efficiency of materials processing by dual action of XUV/Vis-NIR ultrashort laser pulses and comprehensive study of high-order harmonic source at PALS** [7448-04]
K. Jakubczak, T. Mocek, B. Rus, J. Hrebicek, M. Sawicka, Institute of Physics (Czech Republic); I. J. Kim, S. B. Park, T. K. Kim, G. H. Lee, C. H. Nam, Korea Advanced Institute of Science and Technology (Korea, Republic of); J. Chalupsky, V. Hajkova, L. Juha, Institute of Physics (Czech Republic); J. Sobota, T. Fort, Institute of Scientific Instruments (Czech Republic)

- 7448 07 **The fabrication and characterisation of piezoelectric actuators for active x-ray optics** [7448-06]
D. Zhang, D. Rodriguez Sanmartin, T. W. Button, C. Meggs, The Univ. of Birmingham (United Kingdom); C. Atkins, P. Doel, D. Brooks, Univ. College London (United Kingdom); C. Feldman, R. Willingale, Univ. of Leicester (United Kingdom); A. Michette, S. Pfauntsch, S. Sahraei, King's College London (United Kingdom); A. James, Univ. College London (United Kingdom); C. Dunare, T. Stevenson, W. Parkes, The Univ. of Edinburgh (United Kingdom); A. Smith, Science and Technology Facilities Council (United Kingdom); H. Wang, Diamond Light Source Ltd. (United Kingdom)
- 7448 08 **Progress on the development of active micro-structured optical arrays for x-ray optics** [7448-07]
D. Rodriguez Sanmartin, D. Zhang, T. Button, The Univ. of Birmingham (United Kingdom); C. Atkins, P. Doel, Univ. College London (United Kingdom); H. Wang, Diamond Light Source Ltd. (United Kingdom); D. Brooks, Univ. College London (United Kingdom); C. Feldman, R. Willingale, Univ. of Leicester (United Kingdom); A. Michette, S. Pfauntsch, S. Sahraei, M. Shand, King's College London (United Kingdom); A. James, Univ. College London (United Kingdom); C. Dunare, T. Stevenson, W. Parkes, The Univ. of Edinburgh (United Kingdom); A. Smith, Science and Technology Facilities Council (United Kingdom)
- 7448 09 **Optical path function calculation for an incoming cylindrical wave** [7448-08]
W. R. McKinney, J. M. Glossinger, H. A. Padmore, M. R. Howells, Lawrence Berkeley National Lab. (United States)
- 7448 0A **Improvement of the angular resolution of a thin-foil-nested x-ray telescope** [7448-09]
T. Hayashi, T. Sato, M. Ishida, Japan Aerospace Exploration Agency (Japan) and Tokyo Metropolitan Univ. (Japan); Y. Maeda, H. Mori, R. Nakamura, Japan Aerospace Exploration Agency (Japan); T. Shirata, Tokyo Metropolitan Univ. (Japan); K. Someya, Japan Aerospace Exploration Agency (Japan); Y. Ogasaka, K. Torii, Nagoya Univ. (Japan)

SESSION 3 FOCUSING OPTICS AND APPLICATIONS

- 7448 0B **Nested mirrors for x-rays and neutrons** [7448-10]
G. E. Ice, Oak Ridge National Lab. (United States); R. I. Barabash, Oak Ridge National Lab. (United States) and The Univ. of Tennessee at Knoxville (United States); A. Khounsary, Argonne National Lab. (United States)
- 7448 0D **Absolute efficiency measurement of high-performance zone plates** [7448-12]
S. Chen, A. Lyon, Xradia, Inc. (United States); J. Kirz, Xradia, Inc. (United States) and Lawrence Berkeley National Lab. (United States); S. Seshadri, Y. Feng, M. Feser, S. Sassolini, F. Duewer, X. Zeng, C. Huang, Xradia, Inc. (United States)

SESSION 4 MULTILAYER OPTICS AND APPLICATIONS I

- 7448 0H **Thickness control of large area x-ray multilayers** [7448-16]
C. Morawe, J.-Ch. Peffen, European Synchrotron Radiation Facility (France)

- 7448 OJ **5000 groove/mm multilayer-coated blazed grating with 33% efficiency in the 3rd order in the EUV wavelength range** [7448-18]
D. L. Voronov, E. H. Anderson, R. Cambie, F. Salmassi, E. M. Gullikson, V. V. Yashchuk, H. A. Padmore, Lawrence Berkeley National Lab. (United States); M. Ahn, C.-Ch. Chang, R. K. Heilmann, M. L. Schattenburg, Massachusetts Institute of Technology (United States)
- 7448 OK **1D-KBA microscope using double-periodic multilayer** [7448-19]
B. Mu, Z. Wang, S. Yi, J. Zhu, X. Wang, L. Jiang, Q. Huang, Tongji Univ. (China); Y. Bai, Changchun Institute of Optics, Fine Mechanics and Physics (China)

SESSION 5 MULTILAYER OPTICS AND APPLICATIONS II

- 7448 OM **Multilayer optics for femtosecond-diffractometry** [7448-22]
J. Wiesmann, F. Hertlein, C. Michaelsen, Incoatec GmbH (Germany)
- 7448 ON **Narrowband multilayer mirrors for the extreme ultraviolet spectral range of 50 to 95 nm** [7448-23]
M. Vidal-Dasilva, M. Fernández-Perea, J. I. Larruquert, J. A. Méndez, J. A. Aznárez, Consejo Superior de Investigaciones Científicas (Spain)

SESSION 6 OPTICS AND APPLICATIONS I

- 7448 OO **A fixed included angle monochromator for the 4th generation light source at FERMI@Elettra** [7448-24]
C. Svetina, Sincrotrone Trieste S.C.p.A. (Italy); M. Zangrando, Lab. TASC INFN-CNR (Italy); A. Bianco, D. Cocco, Sincrotrone Trieste S.C.p.A. (Italy)
- 7448 OP **Analysis of a spatial structure of a focused x-ray beam diffracted from crystals** [7448-25]
A. Kazimirov, Cornell Univ. (United States); V. Kohn, Russian Research Ctr. Kurchatov Institute (Russian Federation); A. Snigirev, I. Snigireva, European Synchrotron Radiation Facility (France)
- 7448 OQ **New microfocus source for x-ray diffractometry in the home-lab** [7448-26]
B. Hasse, J. Wiesmann, C. Michaelsen, Incoatec GmbH (Germany)

SESSION 7 OPTICS AND APPLICATIONS II

- 7448 OS **Gain spectrum in gated x-ray MCPs** [7448-38]
G. A. Kyrala, J. Oertel, T. Archuleta, Los Alamos National Lab. (United States); J. Holder, Lawrence Livermore National Lab. (United States)
- 7448 OT **Evaluation of data storage layer thickness best fitted for digital data read-out procedure from hard x-ray optical memory** [7448-29]
H. P. Bezirganyan, V Group Inc. (United States); S. E. Bezirganyan, Yerevan State Medical Univ. (Armenia); P. H. Bezirganyan, Jr., V Group Inc. (United States); H. H. Bezirganyan, Jr., X-ROM, Inc. (United States)

- 7448 OU **The NSLS-II multilayer Laue lens deposition system** [7448-40]
R. Conley, N. Bouet, J. Biancarosa, Q. Shen, Brookhaven National Lab. (United States);
L. Boas, J. Feraca, L. Rosenbaum, CVD Equipment Corp. (United States)

POSTER SESSION

- 7448 OX **Zone plate tilt study in transmission x-ray microscope system at 8-11 keV** [7448-32]
F.-H. Chao, National Chiao Tung Univ. (Taiwan) and National Synchrotron Radiation
Research Ctr. (Taiwan); G.-C. Yin, K. S. Liang, National Synchrotron Radiation Research Ctr.
(Taiwan); Y.-C. Lai, National Chiao Tung Univ. (Taiwan)
- 7448 OY **Development of a high-precision slit for x-ray beamline at SPring-8** [7448-33]
T. Takeuchi, M. Tanaka, T. Miura, Y. Senba, Y. Shimada, H. Tajiri, O. Sakata, M. Sato,
T. Koganezawa, K. Uesugi, H. Ohashi, S. Goto, SPring-8/Japan Synchrotron Radiation
Research Institute (Japan)
- 7448 OZ **Design optimization of highly accurate elliptical mirrors for hard-x-ray microfocusing probes
at SPring-8** [7448-34]
H. Yumoto, SPring-8/Japan Synchrotron Radiation Research Institute (Japan); K. Hirata,
A. Nisawa, G. Ueno, SPring-8/RIKEN (Japan); M. Sato, J.-Y. Son, T. Koganezawa, M. Machida,
T. Muro, I. Hirosawa, M. Suzuki, N. Kawamura, M. Mizumaki, SPring-8/Japan Synchrotron
Radiation Research Institute (Japan); H. Ohashi, SPring-8/Japan Synchrotron Radiation
Research Institute (Japan) and SPring-8/RIKEN (Japan); M. Yamamoto, SPring-8/RIKEN
(Japan); Y. Watanabe, SPring-8/Japan Synchrotron Radiation Research Institute (Japan);
S. Goto, SPring-8/Japan Synchrotron Radiation Research Institute (Japan) and
SPring-8/RIKEN (Japan)
- 7448 IO **Comparative study of x-ray scattering by first-order perturbation theory and generalized
Harvey-Shack theory** [7448-35]
Y. Wang, Changchun Institute of Optics, Fine Mechanics and Physics (China) and Graduate
School of the Chinese Academy of Sciences (China); Y. Meng, Changchun Institute of
Optics, Fine Mechanics and Physics (China), Graduate School of the Chinese Academy of
Sciences (China), and Northeast Normal Univ. (China); W. Ma, B. Chen, B. Chen,
Changchun Institute of Optics, Fine Mechanics and Physics (China)

Author Index

Conference Committee

Program Track Chairs

Sandra G. Biedron, Argonne National Laboratory (United States)
Massimo Altarelli, Deutsches Elektronen-Synchrotron (Germany)

Conference Chairs

Ali M. Khounsary, Argonne National Laboratory (United States)
Christian Morawe, European Synchrotron Radiation Facility (France)
Shunji Goto, Japan Synchrotron Radiation Research Institute (Japan)

Program Committee

Lahsen Assoufid, Argonne National Laboratory (United States)
Stefan Braun, Fraunhofer-Institut für Werkstoff- und Strahltechnik (Germany)
Shih-Lin Chang, National Tsing Hua University (Taiwan)
Sultan B. Dabagov, Istituto Nazionale di Fisica Nucleare (Italy)
Ralf D. Geckeler, Physikalisch-Technische Bundesanstalt (Germany)
Hans M. Hertz, Kungliga Tekniska Högskolan (Sweden)
Werner H. Jark, Sincrotrone Trieste S.C.p.A. (Italy)
Alexander Y. Kazimirov, Cornell University (United States)
George A. Kyrala, Los Alamos National Laboratory (United States)
Carolyn A. MacDonald, SUNY/University at Albany (United States)
Howard A. Padmore, Lawrence Berkeley National Laboratory (United States)
Ladislav Pina, Czech Technical University in Prague (Czech Republic)
Michael J. Pivovarov, Lawrence Livermore National Laboratory (United States)
Yuriy Y. Platonov, Rigaku Innovative Technologies, Inc. (United States)
Kawal J. S. Sawhney, Diamond Light Source Ltd. (United Kingdom)
Regina Soufli, Lawrence Livermore National Laboratory (United States)
Makina Yabashi, Japan Synchrotron Radiation Research Institute (Japan)
Kazuto Yamauchi, Osaka University (Japan)
Brian W. Yates, Canadian Light Source Inc. (Canada)

Session Chairs

- 1 Metrology and Applications
Lahsen Assoufid, Argonne National Laboratory (United States)
Ralf D. Geckeler, Physikalisch-Technische Bundesanstalt (Germany)

- 2 Mirrors and Applications
Ali M. Khounsary, Argonne National Laboratory (United States)
Kazuto Yamauchi, Osaka University (Japan)
- 3 Focusing Optics and Applications
Shunji Goto, Japan Synchrotron Radiation Research Institute (Japan)
- 4 Multilayer Optics and Applications I
George A. Kyrala, Los Alamos National Laboratory (United States)
- 5 Multilayer Optics and Applications II
Christian Morawe, European Synchrotron Radiation Facility (France)
- 6 Optics and Applications I
Ali M. Khounsary, Argonne National Laboratory (United States)
- 7 Optics and Applications II
Shunji Goto, Japan Synchrotron Radiation Research Institute (Japan)