

PXRNMS2023 Program

Oral Presentation Wednesday, 11th Oct.

Page No.

Conference Place: Medium Hall of Acrea Himeji

https://www.himeji-ccc.jp/img/pdf/pamphlet_A4-en-202304.pdf

9:00 **Coffee & Sandwich**

9:55 **Opening Remarks**

Takeo Watanabe (Univ. of Hyogo)

10:05 **(Keynote)**

Development and Application of Multilayer Mirror

13

Hisataka Takenaka (TOYAMA)

10:45 **(Invited)**

Tailoring the nanoscale multilayer optics with high efficiency and precision for EUV, X-ray and Neutron applications

14

Qiushi Huang, Runze Qi, Zhe Zhang, Zhong Zhang ,
Wenbin Li, Shengzhen Yi, Zhanshan Wang (Tongji University)
Igor V. Kozhevnikov (Shubnikov Institute of Crystallography))

11:10 **— Coffee Break (30 min)—**

11:40 **(Invited)**

Interface characterization of neutron and X-ray multilayer using Grazing Incidence X-ray Absorption & Fluorescence spectroscopy experiments at Indus-2 SRS

15

Arup Biswas (Bhabha Atomic Research Centre)

12:05 **(Invited)**

Current Status and Prospects for EUV Lithography Which Is a Significant Application Using Multilayers

16

Takeo Watanabe, Tetsuo Harada, and Shinji Yamakawa (Univ. of Hyogo)

12:30 **— Lunch (90 min) with Lunch box @ 409 meeting room —**

14:00 **(Invited)**

Resolving and improving the interfaces of Soft X-ray Multilayers

17

Marcelo Ackermann (Univ. of Twente)

14:25 High Reflective C/B Multilayer for Beyond EUV Lithography

18

Tetsuo Harada, Umi Fujimoto, Shinji Yamakawa, Takeo Watanabe (Univ. of Hyogo)

14:45 **— Coffee Break (30 min)—**

15:15 **Poster Presentations (120 min) @ Foyer of Medium Hall**

17:15 **Communication Party @ Foyer of Medium Hall**

Oral Presentation
Thursday, 12th Oct.

8:30	Coffee & Sandwich	
	(Invited)	
9:00	Multilayer reflective optics for intense high-energy X-rays at SPring-8	19
	<u>Takahisa Koyama</u> (Japan Synchrotron Radiation Research Institute (JASRI))	
9:25	Highly efficient ultra-low blaze angle multilayer grating	20
	<u>Dmitriy Voronov</u> , Sooyeon Park, Eric Gullikson, Farhad Salmassi and Howard Padmore (Lawrence Berkeley National Laboratory)	
9:45	Multilayer-coated blazed grating for high transmission tender X-ray energy range monochromator	21
	<u>Andrey Sokolov</u> , Stephanie Lemke, Svyatoslav Alimov, Jeniffa Knedel, Oliver Kutz, Tino Seliger, Grzegorz Gwalt, Franz Schfers, Friedmar Senf, Frank Siewert, Jens Viehhaus (Helmholtz-Zentrum Berlin für Materialien und Energie, BESSY-II, Berlin, Germany) Qiushi Huang, Yeqi Zhuang, Runze Qi, Zhong Zhang, Wenbin Li, Zhanshan Wang (Key Laboratory of Advanced Micro-Structured Materials MOE, Institute of Precision Optical Engineering, School of Physics Science and Engineering, Tongji University, Shanghai, China)	
10:05	— Coffee Break (30 min)—	
10:35	Optimisation of Cr/Sc-based multilayer coatings for water window applications	22
	<u>Evgueni Meltchakov</u> , Sbastien de Rossi, Eirini Papagiannouli, Franck Delmotte (Université Paris-Saclay, Institut d'Optique Graduate School) Blandine Capitanio, Pascal Mercere (Synchrotron Soleil)	
10:55	Synthesis and characterization of short- and ultrashort W-based multilayers for soft x-rays	23
	<u>Dennis Ijpes</u> , Andrey E. Yakshin, Jacobus M. Sturm, Marcelo D. Ackermann (University of Twente)	
11:15	NiV-based Multilayer for Soft and Hard X-ray Mirrors	24
	<u>Zhe Zhang</u> , Qiushi Huang, Runze Qi, Zhong Zhang, Zhanshan Wang (Key Laboratory of Advanced Micro-Structured Materials MOE, Institute of Precision Optical Engineering, School of Physics Science and Engineering, Tongji University, Shanghai, P. R. China)	
11:35	— Lunch with Lunch box @ 409 meeting room —	
13:00	Bus DEPARTURE time @ Acrea Himeji To Excursion of SPring-8, SACLA, NewSUBARU synchrotron facility	
17:00	Bus Arrival time @ Himeji Station Himeji Station South Charter Bus Boarding Area https://goo.gl/maps/PYdjtS6vETic68cQ6	
18:00	Bus DEPARTURE time @ Himeji Station To Banquet at NADA-GIKU Japanese Sake Traditional Restaurant	
19:00	Banquet 120 min	
21:30	Bus Arrival time @ Himeji Station	

Oral Presentation
Friday, 13th Oct.

8:30	Coffee & Sandwich	
	(Invited)	
9:00	Wide Bandwidth Neutron-Spin Polarizer Due to Ferromagnetic Interlayer Exchange Coupling	25
	<u>Ryuji Maruyama</u> (Japan Atomic Energy Agency (JAEA))	
	(Invited)	
9:25	11B4C-containing Ni/Ti multilayer neutron optics	26
	<u>Fredrik Eriksson</u> , Sjoerd Stendahl, Naureen Ghafoor, Anton Zubayer, and Jens Birch (Linkping University, Sweden) Mattias Schwartzkopf (DESY, Hamburg, Germany)	
9:50	Material design optimization for large-m 11B4C-based Ni/Ti supermirror neutron optics	27
	<u>Naureen Ghafoor</u> , Sjoerd Stendahl, Anton Zubayer, Marcus Lorentzon, *Alexei Vorobiev, Jens Birch, Fredrik Eriksson (Department of Physics, Chemistry, and Biology, IFM, Linkping University, Sweden, *Department of Physics and Astronomy, Material Physics, Uppsala University, Sweden, and Institut Max von LauePaul Langevin (ILL), Grenoble, France)	
10:10	10B/11B-modulated chemically homogeneous boron carbide neutron interference mirrors	28
	Jens Birch, <u>Sjoerd Stendahl</u> , Samira Dorri, Anton Zubayer, Naureen Ghafoor, Fredrik Eriksson (Linkping University)	
10:30	— Coffee Break (30 min)—	
	(Invited)	
11:00	All-dielectric multilayer mirrors tuned at vacuum ultraviolet wavelengths	29
	<u>Paloma López-Reyes</u> , Nuria Gutierrez-Luna, Carlos Honrado-Bentez, and Juan Ignacio Larraquert (GOLD-IO-CSIC Instituto de ptica Consejo Superior de Investigaciones Cientificas, Serrano 144, 28006 Madrid, Spain)	
11:25	Design Study of Soft X-Ray Aplanat with Four Multilayer Mirrors in Grazing Incidence Configuration	30
	S. Yamashita, <u>M. Toyoda</u> (Tokyo Polytechnic University)	
11:45	Thermally stable MoNx/Si1-xNx multilayer as a substrate for XSW study of SMSI	31
	<u>Atul Tiwari</u> , Matteo Monai, Ksenia Matveevskii, Sergey N. Yakunin, Marcelo D. Ackermann, Laurens D. B. Mandemaker, Florian Meirer and Igor A. Makhotkin (Industrial Focus Group XUV Optics, MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands)	
12:05	Surface roughening by ion beams: Is ballistics “be-all and end-all”?	32
	<u>Parikshit Phadke</u> , Jacobus M. Sturm, Fred Bijkerk, Marcelo D. Ackermann (University of Twente)	
12:25	— Lunch (90 min) with Lunch box @ 409 meeting room —	
	(Invited)	
13:55	More accurate prediction of optical constants: A prerequisite for the development of next-generation metrology instruments based on soft X-rays	33
	<u>Victor Soltwisch</u> (PTB)	

14:20	Bayesian Inferences and Time-Frequency Analysis Assisted Determination of Optical Constants in the EUV	34
	<u>Qais Saadeh</u> , Victor Soltwisch, Christian Laubis, Michael Kolbe, and Frank Scholze (PTB)	
14:40	Refractive index measurements with improved accuracy for EUV/x-ray multilayer optics	35
	<u>Franck Delmotte</u> , Eirini Papagiannouli (Universit Paris-Saclay) Regina Soufli, Catherine Burcklen (Lawrence Livermore National Laboratory) Farhad Salmassi, Eric Gullikson (Lawrence Berkeley National Laboratory)	
15:00	<u>Closing Remarks</u>	

Poster Program

Wednesday, 11th Oct. 15:15 - 17:15

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The poster board will be available from the morning of 11th to the end of the conference.

The board size is W1200 mm x H1800 mm.

(Recommended poster format: A0 Portrait)

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|---|--|----|
| 1 | Enhancement of Diffraction Efficiency and Spectral Flux with Quasi-Graded Index Coating (QGIC) on Soft X-Ray Lamellar-Type Diffraction Gratings Optimized for B-K and Li-K Emissions | 39 |
| | <p style="text-align: center;"><u>Masato Koike</u>¹⁻³, Tadashi Hatano², Alexander S. Pirozhkov¹, Masami Terauchi²
(¹ Kansai Photon Science Institute, Fundamental Quantum Sciences Directorate,
National Institutes for Quantum Science and Technology
² Institute of Multidisciplinary Research for Advanced Materials, Tohoku University
³ Laboratory of Advanced Science and Technology for Industry, University of Hyogo)</p> | |
| 2 | Development of Narrowband Multilayer Mirrors for Extracting a Single Harmonic from an EUV HHG Source | 40 |
| | <p style="text-align: center;"><u>Suet Yi Liu</u>, Yuya Iwamoto, Hisataka Takenaka (TOYAMA Co. Ltd, Japan)
Hiroki Mashiko, Satoshi Ichimaru, Masatoshi Hatayama (NTT Advanced Technology Corporation, Japan)
Eric Gullikson (Center for X-ray Optics, Lawrence Berkeley National Laboratory, USA)
Tomoya Mizuno, Takayuki Kurihara, Jiro Itatani (Institute for Solid State Physics, the University of Tokyo, Japan)</p> | |
| 3 | Resolving buried interfaces by Low-Energy Ion Scattering | 41 |
| | <p style="text-align: center;"><u>Adele Valpreda</u>, Jacobus M. Sturm, Andrey E. Yakshin, Marcelo Ackermann
(University of Twente)</p> | |
| 4 | Fabrication and characterization of EUV multilayer gratings | 42 |
| | <p style="text-align: center;">A.H.K. Mahmoud, S. de Rossi, Anne-Lise Coutrot, A. Jrome,
E. Meltchakov, E. Papagianouli, <u>F. Delmotte</u> (Universit Paris-Saclay)
B. Capitanio, M. Thomasset (Synchrotron SOLEIL)</p> | |
| 5 | EMIL@BESSY-II: In-situ investigations of material combinations at a synchrotron light source | 43 |
| | <p style="text-align: center;"><u>Stefan Hendel</u>, Regan G. Wilks, Mihaela Gorgoi, Anna Efimenko, Marcus Br
(Helmholtz-Zentrum Berlin)</p> | |
| 6 | Upgrades of PTB's EUV Reflectometry Instrumentation | 44 |
| | <p style="text-align: center;">Andreas Fischer, <u>Christian Laubis</u>, Michael Kolbe, Frank Scholze ((PTB)
Physikalisch-Technische Bundesanstalt)</p> | |
| 7 | Optical Constants of Carbon and Boron material for Beyond EUV Lithography | 45 |
| | <p style="text-align: center;"><u>Umi Fujimoto</u>, Tetsuo Harada, Shinji Yamakawa, Takeo Watanabe (Univ. of hyogo)</p> | |

8	Improved performance of polarizing Fe/Si multilayer neutron optics by 11B4C incorporation	46
	<u>A. Zubayer</u>¹, N. Ghafoor¹, K. rarinsdttir², S. Stendahl¹, A. Glavic³, J. Stahn³, G. Nagy⁴, G. Greczynski¹, M. Schwarzkopf⁵, A. Le Febvrier¹, P. Eklund¹, J. Birch¹, F. Magnus², F. Eriksson¹ (1. Thin Film Physics Division, Department of Physics, Chemistry and Biology (IFM), Linköping University, SE-581 83 Linköping, Sweden 2. Science Institute, University of Iceland, Dunhaga 3, IS-107 Reykjavik, Iceland 3. Paul Scherrer Institut, 5232, Villigen PSI, Switzerland 4. Department of Physics and Astronomy, Uppsala University, SE-75120, Uppsala, Sweden 5. Photon Science, DESY, Notkestrae 85, 22607, Hamburg, Germany)	
9	GeMOX, a Collaborative facility for Development of High-Performance Multilayer Optics (Withdraw)	
	Capitanio Blandine (Synchrotron soleil, Gif-sur-Yvette)	
10	Removal of Mo/Si Multilayer Coatings on Fused Silica Substrates by Wet Chemical Etching	47
	<u>Mitsunori TOYODA</u>, Ryo YOKOYAMA, Shuntaro WAKI, Jun CHEN (Tokyo Polytechnic University) Toshiyuki KAKUDATE (Tohoku University)	
11	Picometer Sensitivity on Laboratory-based XRR Instrument Equipped with Fast and Accurate Sample Alignment System	48
	<u>Hitoshi Morioka</u> (Bruker Japan K.K.) Fernando Rinaldi, Martin Zimmermann (Bruker AXS GmbH)	
12	At-Wavelength Metrology for diffractive and reflective optics in the EUV, XUV and tender X-ray energy range	49
	<u>Andrey Sokolov</u>, Frank Eggenstein, Peter Bischoff, Peter Baumgrtel, Matthias Mast, Marcel Martin, Ingo Packe, Franz Schfers, Frank Siewert, Jens Viefhaus (Helmholtz-Zentrum Berlin fr Materialien und Energie (BESSY-II), Berlin)	
13	Ultra-low thickness thin film multilayer devices for application in Water Window regime of Soft X-ray (Withdraw)	
	<u>Piyali Sarkar Roy</u>, Arup Biswas, Dibyendu Bhattacharyya (Atomic and Molecular Physics Division, Bhabha Atomic Research Centre, Mumbai 400085, INDIA)	
14	Structural, electrical and magnetic properties of reactively DC sputtered Cu and Ti thin films. Application to CuTi neutron supermirrors for low spin-flip applications (Withdraw)	
	<u>Jose Manuel Gómez-Guzmán</u>, Peter Link (Heinz Maier Leibnitz Zentrum, Technische Universität München, Germany) Matthias Opel (Walther-Meißner-Institut, Bayerische Akademie der Wissenschaften, Germany) <u>Tamás Veres</u> (Budapest Neutron Center, Centre for Energy Research, Hungary) László Bottyán (Wigner Research Centre for Physics, Hungary)	
15	Low-Cost Cleaning Method of Mo/Si Multilayer Soft X-ray Mirrors Using a Wet Process	50
	<u>Toshiyuki Kakudate</u> (National Institute of Technology (KOSEN), Hachinohe College) Mitsunori Toyoda (Tokyo Polytechnic University)	

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	<u>Shuntaro Waki</u> , Yusuke Tsukui, Jun Chen, Mitsunori Toyoda (Tokyo Polytechnic University)	
17	Multilayer structures in coherent x-ray diagnostics in BISER and Relativistic Flying Mirror experiments	52
	<u>A. S. Pirozhkov</u> ¹ , A. N. Shatokhin ² , E. A. Vishnyakov ³ , A. Sagisaka ¹ , K. Ogura ¹ , M. Koike ^{1,4,5} , T. Hatano ⁴ , H. Ohiro ⁶ , S. Namba ⁶ , J. K. Koga ¹ , A. O. Kolesnikov ² , H. Kiriama ¹ , T. Zh. Esirkepov ¹ , T. A. Pikuz ⁷ , E. N. Ragozin ² , S. V. Bulanov ³ , M. Kando ¹ (1. Kansai Institute for Photon Science (KPSI), QST, 2. P. N. Lebedev Physical Institute, RAS, 3. ELI-Beamlines, ELI-ERIC, 4. Institute of Multidisciplinary Research for Advanced Materials, Tohoku University 5. Laboratory of Advanced Science and Technology for Industry, University of Hyogo, 6. Department of Advanced Science and Engineering, Hiroshima University 7. Open and Transdisciplinary Research Initiatives, Osaka University)	
17	A new variant of high-performance neutron supermirror polarizer	53
	Thierry Bigault, Alexander K. Petoukhov, Guillaume Delphin, Sébastien Batisse, Amandine Vittoz, Pierre Courtois, Valery V. Nesvizhevsky, Torsten Soldner, David Jullien, Anton Devishvili, Thomas Saerbeck (Institut Max von Laue - Paul Langevin, (ILL), Grenoble, France)	