Optical Microlithography XXVII

Kafai Lai
Andreas Erdmann
Editors

25–27 February 2014
San Jose, California, United States

Volume 9052

Printed in the United States of America Vm7 i ffUb ˙5 gc W]Uh˙gž˙þW˙ži bXYf˙]W˙ bgY˙ˇfca ˙GD=9.

SPIE
Digital Library

SPIEDigitalLibrary.org

Contents

OPTICS AND BEYOND

IMAGE AND PROCESS CONTROL

NON-IC APPLICATIONS

OPC ALGORITHMS

MULTIPLE PATTERNING AND SMO

9052 0O   **Immersion lithography extension to sub-10nm nodes with multiple patterning** [9052-23]
S. Owa, S. Wakamoto, M. Murayama, Nikon Corp. (Japan); H. Yaegashi, K. Oyama, Tokyo
Electron Ltd. (Japan)

9052 0P   **Hybrid lithography for triple patterning decomposition and E-beam lithography** [9052-24]
H. Tian, Univ. of Illinois at Urbana-Champaign (United States); H. Zhang, Synopsys, Inc.
(United States); Z. Xiao, M. F. Wong, Univ. of Illinois at Urbana-Champaign (United States)

9052 0Q   **Metal1 patterning study for random-logic applications with 193i, using calibrated OPC for
litho and etch** [9052-25]
J. Mailfert, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium); J. Van de Kerkhove,
P. De Bisschop, IMEC (Belgium); K. De Meyer, IMEC (Belgium) and Katholieke Univ. Leuven
(Belgium)

9052 0R   **Pattern fidelity in multiple-patterning process** [9052-26]
M. Yamato, S. Natori, S. Yamauchi, A. Hara, K. Oyama, H. Yaegashi, Tokyo Electron Ltd.
(Japan)

9052 0S   **Joint optimization of source, mask, and pupil in optical lithography** [9052-27]
J. Li, E. Y. Lam, The Univ. of Hong Kong (Hong Kong, China)

9052 0T   **Efficient source polarization optimization for robust optical lithography** [9052-28]
X. Ma, J. Gao, C. Han, Y. Li, L. Dong, L. Liu, Beijing Institute of Technology (China)

OVERLAY MEASUREMENT AND CONTROL: JOINT SESSION WITH CONFERENCE 9050

9052 0U   **Characterization and mitigation of overlay error on silicon wafers with nonuniform stress**
[9052-29]
T. Brunner, V. Menon, C. Wong, N. Felix, M. Pike, O. Gluschenkov, M. Belyansky, IBM Corp.
(United States); P. Vukkadala, S. Veeraraghavan, S. Klein, C. H. Hoo, J. Sinha, KLA-Tencor
Corp. (United States)

9052 0V   **Analysis of overlay errors induced by exposure energy in negative tone development
process for photolithography** [9052-30]
Y. H. Kim, J.-S. Kim, Y.-H. Kim, B.-O. Cho, J. Choi, Y. S. Kang, H. Ha, SAMSUNG Electronics
Co., Ltd. (Korea, Republic of)

OPC MODELING

9052 0W   **Hybrid OPC modeling with SEM contour technique for 10nm node process** [9052-31]
K. Hitomi, Hitachi America, Ltd. (United States); S. Halle, M. Miller, I. Graur, N. Saulnier,
D. Dunn, IBM Corp. (United States); N. Okai, Hitachi America, Ltd. (United States); S. Hotta,
A. Yamaguchi, Hitachi, Ltd. (Japan); H. Komuro, T. Ishimoto, S. Koshihara, Y. Hojo, Hitachi
High-Technologies Corp. (Japan)

PATTERN-AWARE TECHNIQUES: JOINT SESSION WITH CONFERENCE 9053

MASK TOPOGRAPHY MODELING

DSA DESIGN FOR MANUFACTURABILITY: JOINT SESSION WITH CONFERENCES 9049 AND 9053

9052 1A   **Computational lithography platform for 193i-guided directed self-assembly** [9052-46]
K. Lai, M. Ozlem, IBM Corp. (United States); J. Pitera, IBM Research - Almaden (United States); C. Liu, A. Schepis, D. Dechene, A. Krasnoperova, D. Brue, J. Abdallah, IBM Corp. (United States); H. Tsai, M. Guillorn, IBM Thomas J. Watson Research Ctr. (United States); J. Cheng, G. Doerk, M. Tjio, IBM Research - Almaden (United States); R. Topalogu, M. Fahkry, N. Lafferty, IBM Corp. (United States)

9052 1B   **Applying ILT mask synthesis for co-optimizing design rules and DSA process characteristics** [9052-47]
T. Dam, W. Stanton, Synopsys, Inc. (United States)

9052 1C   **Rigorous simulation and optimization of the lithography/directed self-assembly co-process** [9052-48]
T. Fühner, Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie IISB (Germany); U. Welling, M. Müller, Georg-August-Univ. Göttingen (Germany); A. Erdmann, Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie IISB (Germany)

TOOLINGS

9052 1D   **Critical assessment of the transport of intensity equation as a phase recovery technique in optical lithography** [9052-49]
A. Shanker, Univ. of California, Berkeley (United States); M. Sczyrba, Advanced Mask Technology Ctr. GmbH Co. KG (Germany); B. Connolly, F. Kalk, Toppan Photomasks, Inc. (Germany); A. Neureuther, L. Waller, Univ. of California, Berkeley (United States)

9052 1E   **Extremely long life and low-cost 193nm excimer laser chamber technology for 450mm wafer multipatterning lithography** [9052-50]
H. Tsushima, H. Katsuumi, H. Ikeda, T. Asayama, T. Kumazaki, A. Kurosu, T. Ohta, K. Kakizaki, T. Matsunaga, H. Mizoguchi, Gigaphoton Inc. (Japan)

9052 1F   **Immersion scanners enabling 10nm half-pitch production and beyond** [9052-52]
H. Egashira, Y. Uehara, Y. Shirata, Y. Shibazaki, J. Ishikawa, T. Funatsu, M. Ohba, Nikon Corp. (Japan)

9052 1H   **Improvements in bandwidth and wavelength control for XLR 660xi systems** [9052-93]
W. Conley, H. Dao, D. Dunlap, Cymer, an ASML company (United States); R. Flores, Canon Inc. (United States); M. Lake, K. O'Brien, A. Russin, A. Simic, J. Thornes, B. Wehrung, J. Wyman, Cymer, an ASML company (United States)

POSTERS: IMAGE CONTROL

9052 1I   **Estimation of 1D proximity budget impacts due to light source for advanced node design** [9052-54]
R. C. Peng, T. Wu, H. H. Liu, Taiwan Semiconductor Manufacturing Co. Ltd. (Taiwan)

POSTERS: TOOLINGS