Guest Editorial Special Section on the 2022 International Symposium on Semiconductor Manufacturing

SINCE its beginning in 1992 in Japan, International Symposium on Semiconductor Manufacturing (ISSM) has provided unique opportunities to share the best practices of semiconductor manufacturing technologies for professionals. At the symposiums, semiconductor manufacturing professionals discussed the technologies developed to meet the worldwide requirements for advanced manufacturing. It is becoming crucial to re-examine semiconductor manufacturing in terms of fundamental principles to improve the performance of semiconductor devices. Moreover, utilizing artificial intelligence and machine learning technologies to improve semiconductor manufacturing have become a new challenge. These manufacturing technology challenges are showing the need for drastic revolutionary concept and stronger collaborative efforts to find solutions to the precompetitive challenges.

The 29th annual ISSM was held during December 12–13, 2022. ISSM 2022 featured 6 keynote speeches by the world's leading speakers having timely and highlighted topics in addition to the ISSM areas of interest, 2 tutorial speeches and 5 invited speeches. Along with more than 220 participants from all over the world, 32 oral presentations, carefully reviewed and selected by program committee members, were presented for 10 technical areas and 1 highlight session.

ISSM contributes to the continued growth of the semiconductor industry through its infrastructure for networking, discussion, and information sharing among the world's professionals. It is our great pleasure to have this invaluable opportunity to introduce extended versions of 9 papers to the readers of the IEEE TRANSACTIONS ON SEMICONDUCTOR MANUFACTURING, based on the best papers selected from ISSM 2022.

Two papers have been created from the category of Intelligent Data Management: [A1] and [A2]. In the area of Process Monitoring and Control Method, there are 2 papers: [A3] and [A4].

The Yield and Defect Control section includes 2 papers: [A5] and [A6].

A paper has been created from the category of Material Informatics: [A7]. In the area of Process/Material Optimization, there are 2 papers: [A8] and [A9].

I would like to thank all the authors and the members of the ISSM Program Committee for their cooperation in preparing and reviewing these manuscripts in a tight deadline. I would also like to thank Prof. Reha Uzsoy, Editor-in-Chief, his assistant, Ms. Ruchira Chaukiyal and Ms. Mie Maeda of Semiconductor Portal Inc. for their guidance and arrangement for the special section.

ISSM is also very grateful for the continuous support from IEEE-Electron Devices Society, Minimal Fab, Semiconductor Equipment Association of Japan (SEAJ), Semiconductor Equipment and Materials International (SEMI), Taiwan Semiconductor Industry Association (TSIA), and the IEEE TRANSACTIONS ON SEMICONDUCTOR MANUFACTURING.

APPENDIX: RELATED ARTICLES

[A1] T. Ito, W. Xueting, Y. Oomuro, and K. Nagashima, "Advanced process control system for trench shape of power devices," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 501–505, Nov. 2023, doi: 10.1109/TSM.2023.3285867.

[A2] Y.-C. Hsieh, C.-Y. Chen, D.-Y. Liao, K.-C. Lin, and S.-C. Chang, "Data cleansing with minimum distortion for ML-based equipment anomaly detection," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 506–514, Nov. 2023, doi: 10.1109/TSM.2023.3262957.

[A3] Y. Sakai et al., "Visualization and analysis of temporal and steady-state gas concentration in process chamber using 70-dB SNR 1000 fps absorption imaging system," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 515–519, Nov. 2023, doi: 10.1109/TSM.2023.3267024.

[A4] S. Y. Chang, S. Tiku, and L. Luu-Henderson, "Advanced process monitoring through fault detection and classification for the process development of tantalum nitride thin-film resistors," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 520–526, Nov. 2023, doi: 10.1109/TSM.2023.3271305.

[A5] T. Yamauchi, K. Ohira, and T. Kakinuma, "Positive/negative decision via outlier detection towards automatic performance evaluation for defect detector," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 527–536, Nov. 2023, doi: 10.1109/TSM.2023.3262539.

[A6] J. Baderot et al., "Automatic classification of C-SAM voids for root cause identification of bonding yield degradation," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 537–542, Nov. 2023, doi: 10.1109/TSM.2023.3281135.

[A7] Y. Harashima et al., "Systematic search for stabilizing dopants in ZrO_2 and HfO_2 using first-principles calculations," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 543–546, Nov. 2023, doi: 10.1109/TSM.2023.3265658.

[A8] S. Takagi, M. Sekine, T. Nakaegawa, and S.-N. Hsiao, "Optimization of RF frequencies in dual-frequency capacitively coupled plasma apparatus using genetic algorithm (GA) and plasma simulation," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 547–552, Nov. 2023, doi: 10.1109/TSM.2023.3282566

[A9] S.-I. Ohmi, M. Tanuma, and J.-W. Shin, "Effect of SiO_2 interfacial layer reduction on MFSFET with 5 nm-thick ferroelectric nondoped HfO_2 by deposition rate control," *IEEE Trans. Semicond. Manuf.*, vol. 36, no. 4, pp. 553–557, Nov. 2023, doi: 10.1109/TSM.2023.3284829.

TSUYOSHI MORIYA, *Guest Editor*
Corporate Innovation Division
Tokyo Electron Ltd.
Tokyo 107-6325, Japan

Digital Object Identifier 10.1109/TSM.2023.3323254

Tsuyoshi Moriya received the B.S. and M.S. degrees in engineering from the University of Tsukuba, the M.B.A. degree from The University of Wales, and the Ph.D. degree from Hiroshima University. From 1997 to 2001, he was with NEC Corporation. In 2001, he joined Tokyo Electron Ltd., where he is currently the Vice President. He is also a Visiting Professor with the University of Tsukuba. His research interests include high-yield semiconductor manufacturing and AI technologies.