Resume

Name: **Yan Qiao**
Address: A404b, Macau Institute of Systems Engineering, Macau University of Science and Technology, Avenida Wai Long, Taipa, Macau 999078, China
E-mail: yqiao@must.edu.mo

Education:

June, 2015	Ph. D. degree in Mechanical Engineering, Guangdong University of Technology, Guangzhou, China
June, 2009	B. S. degree in Industrial Engineering, Guangdong University of Technology, Guangzhou, China

Research interests:

Modeling, scheduling, and control of semiconductor manufacturing systems; Discrete event systems; Petri nets; Scheduling and control; Intelligent computing.

Experience:

Jan. 2018 – Now	Assistant Professor at the Institute of Systems Engineering, Macau University of Science and Technology, Macau
Jan. 2016 – Dec. 2017	Postdoctoral Fellow at the Institute of Systems Engineering, Macau University of Science and Technology, Macau
Sep. 2014 – Sep. 2015:	Visiting student at the department of Electrical and Computer Engineering, New Jersey Institute of Technology, USA

Affiliations:

[1] Member of IEEE

Honors and Awards:

[1] Best Student Paper Award – Finalist, for the paper "Bi-modal Traffic Management Integrating Perimeter Control and Regional Bus Service Frequency Setting", by S. F. Chen, N. Q. Wu, H. Fu, Y. Qiao, and Y. F. Wang, *IEEE International Conference on Automation Science and Engineering*, online Zoom Meeting, August 20-21, 2020;

[2] The 2018 Science and Technology Award of Jiangxi Province of China-The Second Prize of Natural Science Award;

[3] 2018 BOC (Bank of China) Excellent Research Award;

[4] The 2018 Science and Technology Award of Macau-The Third Prize of Natural Science Award;

[5] Best Conference Paper Award – Finalist, for the paper "Optimizing Close-Down Processes of Single-Robot Cluster Tools Via Linear Programing", by Y. Qiao, M. C. Zhou, N. Q. Wu, Q. H. Zhu, and Z. W. Li, *IEEE International Conference on Automation Science and Engineering*, Fort Worth, TX USA, August 21- 24, 2016;

[6] Received "Outstanding Graduate Student Award of Guangdong Province of China" in 2015;

[7] Received “National Postgraduate Students Scholarship of China” in December, 2014;
[8] Received “National Postgraduate Students Scholarship of China” in December, 2013;
[9] Received “National Postgraduate Students Scholarship of China” in November, 2012;
[10] Best Student Paper Award, for the paper "Real-time control policy for single-arm cluster tools with residency time constraints and activity time variation by using Petri net," by Y. Qiao, N. Q. Wu, and M. C. Zhou, *IEEE International Conference on Networking, Sensing and Control*, Beijing, China, April 11-13, 2012;
[11] 2011 QSI Best Application Paper Award Finalist, for the paper "Modeling and Analysis of Dual-Arm Cluster Tools for Wafer Fabrication with Revisiting," by Y. Qiao, N. Wu, and M. C. Zhou, *IEEE International Conference on Automation Science and Engineering*, Trieste, Italy, August 24 - 27, 2011;

Professional activities and services:

[1] Program Committee Member of 2017 – 2019 *IEEE International Conference on Networking, Sensing and Control*;
[2] Organizer and Chair of Special Session of Modeling, Control, Scheduling and Optimization of Discrete Event Systems in 2018 *IEEE International Conference on Networking, Sensing and Control*;
[3] Co-Chair of Scheduling and Optimization Session in 2016 *IEEE International Conference on Automation Science and Engineering*;
[4] Serving a reviewer for the following journals and conferences:
- IEEE Transactions on Systems, Man and Cybernetics: Systems;
- IEEE Transactions on Control Systems Technology;
- IEEE Transactions on Automation Science and Engineering;
- IEEE Systems Journal;
- IEEE Internet of Things Journal;
- IEEE/CAA Journal of Automatica Sinica;
- IEEE Access;
- Computers & Operations Research;
- International Journal of Production Research;
- Information Sciences;
- Applied Soft Computing;
- Future Generation Computer Systems;
- Journal of Intelligent Manufacturing;
- Journal of Parallel and Distributed Computing;
- IISE Transactions;
- Applied Energy;
- IEEE International Conference on Systems, Man and Cybernetics;
- IEEE International Conference on Networking, Sensing and Control;
- IEEE International Conference on Robotics and Automation;
- IEEE International Conference on Automation Science and Engineering;

Project (as **PI**)**:**

[1] “Modeling, Control and Scheduling of Cluster Tools with Complex Constraints,” National Natural Science Foundation of China under Grant 61803397, Jan. 2019 – Dec. 2021;

Publications:

Book and book chapters:

[1] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, Real-time scheduling and control of single-arm cluster tools with residency time constraint and activity time variation by using resource-oriented Petri nets, (DOI: 10.4018/978-1-4666-4034-4.ch008), in Z. W. Li and A. M. Al-Ahmari (Ed.), *Formal Methods in Manufacturing Systems: Recent Advances*, IGI Global, New York, May, 2013. (DOI: 10.4018/978-1-4666-4034-4).

Selected journal articles:

2020

[1] **Y. Qiao**, M. C. Zhou, N. Q. Wu, Z. W. Li, and Q. H. Zhu, "Closing-down optimization for single-arm cluster tools subject to wafer residency time constraints," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, in press, DOI: 10.1109/TSMC.2020.2964032.

[2] **Y. Qiao**, S. W. Zhang, N. Q. Wu, M. C. Zhou, Z. W. Li, and T. Qu, "Efficient approach to failure response of process module in dual-arm cluster tools with wafer residency time constraints," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, in press, DOI: 10.1109/TSMC.2019.2899590.

[3] J. Liu, N. Q. Wu, **Y. Qiao**, and Z. W. Li, "Short-term traffic flow forecasting using ensemble approach based on deep belief networks," ***IEEE Transactions on Intelligent Transportation Systems***, in press, DOI: 10.1109/TITS.2020.3011700.

[4] W. Q. Xiong, C. R. Pan*, **Y. Qiao***, N. Q. Wu, M. X. Chen, P. H. Hsieh, "Reducing wafer delay time by robot idle time regulation for single-arm cluster tools," ***IEEE Transactions on Automation Science and Engineering***, in press, DOI: 10.1109/TASE.2020.3014078.

[5] Z. C. Liu, N. Q. Wu, **Y. Qiao**, and Z. W. Li, "Performance evaluation of public bus transportation by using DEA models and shannon's entropy: an example from a company in a large city of china," ***IEEE/CAA Journal of Automatica Sinica***, in press, 2020.

[6] M. Ghahramani, **Y. Qiao**, M. C. Zhou, A. O'hagan, and J. Sweeney, "AI-based Modeling and Data-driven Evaluation for Smart Manufacturing Processes," ***IEEE/CAA Journal of Automatica Sinica***, in press, DOI: 10.1109/JAS.2020.1003114.

[7] F. J. Yang, N. Q. Wu, **Y. Qiao**, R. Su, and C. J. Zhang, "Wafer sojourn time fluctuation analysis for time-constrained dual-arm multi-cluster tools with activity time variation," ***International Journal of Computer Integrated Manufacturing***, in press, https://doi.org/10.1080/0951192X.2020.1718767.

[8] Q. H. Zhu, M. C. Zhou, **Y. Qiao**, N. Q. Wu, Y. Hou, "Multiobjective scheduling of dual-blade robotic cells in wafer fabrication," ***IEEE Transactions on Systems, Man and Cybernetics: Systems***, in press, DOI: 10.1109/TSMC.2019.2944866.

[9] F. J. Yang, **Y. Qiao**, K. Z. Gao, N. Q. Wu, Y. T. Zhu, I. W. Simon, and R. Song, "Efficient approach to scheduling of transient processes for time-constrained single-arm cluster tools with parallel chambers," ***IEEE Transactions on Systems, Man and Cybernetics: Systems***, in press, DOI: 10.1109/TSMC.2018.2852724.

[10] Q. H. Zhu, **Y. Qiao**, N. Q. Wu, and Y. Hou, "Post-processing time-aware optimal scheduling of single robotic cluster tools," ***IEEE/CAA Journal of Automatica Sinica***, vol. 7, no. 2, pp. 597–605, Mar. 2020.

[11] F. J. Yang, N. Q. Wu, **Y. Qiao**, M. C. Zhou, R. Su, T. Qu, "Modeling and optimal cyclic scheduling of time-constrained single-robot-arm cluster tools via Petri nets and linear programming," ***IEEE Transactions on Systems, Man and Cybernetics: Systems***, vol. 50, no. 3, pp. 871-883, March 2020.

2019

[12] **Y. Qiao**, S. W. Zhang, N. Q. Wu, X. Wang, Z. W. Li, M. C. Zhou, and T. Qu, "Data-driven approach to optimal control of ACC systems and layout design in large rooms with thermal comfort consideration by using PSO," ***Journal of Cleaner Production***, vol. 236, DOI: 10.1016/j.jclepro.2019.07.053, 2019.

[13] **Y. Qiao**, N. Q. Wu, F. J. Yang, M. C. Zhou, Q. H. Zhu, and T. Qu, "Robust scheduling of time-constrained dual-arm cluster tools with wafer revisiting and activity time disturbance," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 49, no. 6, pp. 1228-1240, June 2019.

[14] Q. H. Zhu, **Y. Qiao**, N. Q. Wu, "Optimal integrated schedule of entire process of dual-blade multi-cluster tools from start-up to close-down," ***IEEE/CAA Journal of Automatica Sinica***, vol. 6, no. 2, pp. 553-565, March 2019.

2018

[15] **Y. Qiao**, N. Q. Wu, F. J. Yang, M. C. Zhou, and Q. H. Zhu, "Wafer sojourn time fluctuation analysis of time-constrained dual-arm cluster tools with wafer revisiting and activity time variation," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 48, no. 4, pp. 622-636, April 2018.

[16] F. J. Yang, N. Q. Wu, K. Z. Gao, C. J. Zhang, Y. T. Zhu, R. Su, **Y. Qiao**, "Efficient approach to cyclic scheduling of single-arm cluster tools with chamber cleaning operations and wafer residency time constraint," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 31, no. 2, pp. 196-205, May 2018.

[17] C. R. Pan, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Scheduling cluster tools in semiconductor manufacturing: recent advances and challenges," ***IEEE Transactions on Automation Science and Engineering***, vol. 15, no. 2, pp. 586-601, April 2018.

[18] X. Wang, N. Q. Wu, **Y. Qiao**, Q. B. Song, "Assessment of energy-saving practices of the hospitality industry in Macau," ***Sustainability***, vol. 10, no. 1, DOI: 10.3390/su10010255, 2018.

[19] X. Wang, **Y. Qiao***, N. Q. Wu, Z. W. Li, and T. Qu, "On optimization of thermal sensation satisfaction rate and energy efficiency of public rooms: a case study," ***Journal of Cleaner Production***, vol. 176, pp. 990-998, 2018.

[20] F. J. Yang, N. Q. Wu, **Y. Qiao**, R. Su, "Polynomial approach to optimal one-wafer cyclic scheduling of treelike hybrid multi-cluster tools via Petri nets," ***IEEE/CAA Journal of Automatica Sinica***, vol. 5, no. 1, pp. 270-280, Jan. 2018.

[21] F. J. Yang, N. Q Wu, **Y. Qiao**, M. C Zhou, R. Su, and T. Qu, "Petri net-based efficient determination of optimal schedules for transport-dominant single-arm multi-cluster tools," ***IEEE Access***, vol. 6, pp. 355-365, 2018.

[22] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal one-wafer cyclic scheduling of hybrid multirobot cluster tools with tree topology," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 48, no. 2, pp. 289-298, Feb. 2018.

[23] Q. H. Zhu, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Petri net modeling and scheduling of a close-down process for time-constrained single-arm cluster tools," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 48, no. 3, pp. 389–400, March 2018.

2017

[24] **Y. Qiao**, M. C. Zhou, N. Q. Wu, and Q. H. Zhu, "Scheduling and control of startup process for single-arm cluster tools with residency time constraints," ***IEEE Transactions on Control Systems Technology***, vol. 25, no. 4, pp. 1243-1256, July 2017.

[25] Q. H. Zhu, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Scheduling transient processes for time-constrained single-arm robotic multi-cluster tools," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 30, no. 3, pp. 261-269, August 2017.

[26] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal one-wafer cyclic scheduling of time-constrained hybrid multicluster tools via Petri nets," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 47, no. 11, pp. 2920–2932, Nov. 2017.

[27] F. J. Yang, N. Q. Wu, **Y. Qiao**, M. C. Zhou, and Z. W. Li, "Scheduling of single-arm cluster tools for an atomic layer deposition process with residency time constraints," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 47, no. 3, pp. 502-516, March 2017.

[28] N. He, **Y. Qiao**, N. Q. Wu, and T. Qu, "Total completion time minimization for scheduling of two-machine flow shop with deterioration jobs and setup time," ***Advances in Mechanical Engineering***, vol. 9, no. 4, pp. 1-12, 2017.

2016

[29] Q. H. Zhu, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal scheduling of complex multi-cluster tools based on timed resource-oriented Petri nets," ***IEEE Access***, vol. 4, pp. 2096-2109, 2016.

2015

[30] **Y. Qiao**, C. R. Pan, N. Q. Wu, and M. C. Zhou, "Response policies to process module failure in single-arm cluster tools subject to wafer residency time constraints," ***IEEE Transactions on Automation Science and Engineering***, vol. 12, no. 3, pp. 1125-1139, July 2015.

[31] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Schedulability and scheduling analysis of dual-arm cluster tools with wafer revisiting and residency time constraints based on a novel schedule," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 45, no. 3, pp. 472-484, March 2015.

[32] **Y. Qiao**, N. Q. Wu, Q. H. Zhu, and L. P. Bai, "Cycle time analysis of dual-arm cluster tools for wafer fabrication processes with multiple wafer revisiting times," ***Computers & Operations Research***, vol. 53, pp. 252-260, January 2015.

[33] C. R. Pan, **Y. Qiao**, M. C. Zhou, and N. Q. Wu, "Scheduling and analysis of start-up transient processes for dual-arm cluster tools with wafer revisiting," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 28, no. 2, pp. 160-170, May 2015.

[34] C. R. Pan, **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "A novel algorithm for wafer sojourn time analysis of single-arm cluster tools with wafer residency time constraints and activity time variation," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 45, no. 5, pp. 805-818, May 2015.

[35] Q. H. Zhu, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Scheduling of single-arm multi-cluster tools with wafer residency time constraints in semiconductor manufacturing," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 28, no. 1, pp. 117-125, Feb. 2015.

2014

[36] **Y. Qiao**, N. Q. Wu, C. R. Pan, and M. C. Zhou, "How to respond to process module failure in residency time-constrained single-arm cluster tools," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 27, no. 4, pp. 462-474, Nov. 2014.

[37] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Scheduling of dual-arm cluster tools with wafer revisiting and residency time constraints," ***IEEE Transactions on Industrial Informatics,*** vol. 10, no. 1, pp. 286-300, Feb. 2014.

[38] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal one-wafer cyclic scheduling of single-arm multicluster tools with two-space buffering modules," ***IEEE Transactions on Systems, Man and Cybernetics: Systems***, vol. 44, no. 12, pp. 1584-1597, Dec. 2014.

[39] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Petri net-based polynomially complex approach to optimal one-wafer cyclic scheduling of hybrid multi-cluster tools in semiconductor manufacturing," ***IEEE Transactions on Systems, Man and Cybernetics: Systems***, vol. 44, no. 12, pp. 1598-1610, Dec. 2014.

[40] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Petri net-based optimal one-wafer cyclic scheduling of hybrid multi-cluster tools in wafer fabrication," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 27, no. 2, pp. 192-203, May 2014.

2013

[41] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "A Petri net–based novel scheduling approach and its cycle time analysis for dual-arm cluster tools with wafer revisiting," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 26, no. 1, pp. 100-110, Feb. 2013.

[42] Q. H. Zhu, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Petri net-based optimal one-wafer scheduling of single-arm multi-cluster tools in semiconductor manufacturing," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 26, no. 4, pp. 578-591, Nov. 2013.

2012

[43] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Real-time scheduling of single-arm cluster tools subject to residency time constraints and bounded activity time variation," ***IEEE Transactions on Automation Science and Engineering***, vol. 9, no. 3, pp. 564-577, July 2012.

[44] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Petri net modeling and wafer sojourn time analysis of single-arm cluster tools with residency time constraints and activity time variation," ***IEEE Transactions on Semiconductor Manufacturing***, vol. 25, no. 3, pp. 432-446, August 2012.

Conference papers:

2020

[1] S. F. Chen, N. Q. Wu, H. Fu, Y. Qiao, and Y. F. Wang, "Bi-modal traffic management integrating perimeter control and regional bus service frequency setting," ***IEEE International Conference on Automation Science and Engineering***, pp. 254-259, online Zoom Meeting, August 20-21, 2020.

2019

[2] **Y. Qiao**, S. W. Zhang, N. Q. Wu, and Z. W. Li, "Optimization on ACC systems and layout design for maximizing thermal comfort and energy saving in large rooms – a case study," ***IEEE Congress on Evolutionary Computation,*** pp. 654-659, *Wellington*, New Zealand, June 10-13, 2019.

2018

[3] F. J. Yang, N. Q. Wu, R. Su, and **Y. Qiao**, "Cyclic scheduling analysis of single-arm cluster tools with wafer residency time constraint and chamber cleaning operations," ***IEEE International Conference on Automation Science and Engineering***, pp. 241-246, Munich, Germany, August 20-24, 2018.

[4] F. J. Yang, **Y. Qiao**, K. Z. Gao, N. Q. Wu, Y. T. Zhu, I. W. Simon, R. Su, "Scheduling and control of start-up process for time-constrained single-arm cluster tools with parallel chambers,"

IFAC-PapersOnLine/14th IFAC Workshop on Discrete Event Systems WODES, vol. 51, no. 7, pp. 251-256, 2018.

[5] Y. J. Lu, C. R. Pan, **Y. Qiao**, N. Q. Wu, Y. F. Chen, "Petri net-based deadlock avoidance for single-arm cluster tools with concurrently processing two-type wafers," ***IEEE International Conference on Networking, Sensing and Control***, Zhuhai, China, March 27-29, 2018.

2017

[6] Q. H. Zhu, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Close-down Process Scheduling of Wafer Residence Time-Constrained Multi-cluster Tools", ***IEEE International Conference on Robotics and Automation***, pp.543-548, Singapore, May 29 - June 3, 2017.

2016

[7] **Y. Qiao**, M. C. Zhou, N. Q. Wu, Q. H. Zhu, and Z. L. Wu, "Optimizing close-down processes of single-robot cluster tools via linear programing," ***IEEE International Conference on Automation Science and Engineering***, pp. 148-153, Fort Worth, TX, USA, August 21-24, 2016.

[8] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal scheduling analysis of treelike hybrid multi-cluster tools," ***IEEE International Conference on Automation Science and Engineering***, pp. 1400-1404, Fort Worth, TX, USA, August 21-24, 2016.

[9] Z. C. Liu, N. Q. Wu, F. J. Yang, and **Y. Qiao**, "Optimal scheduling of time-constrained single-arm cluster tools with wafer revisiting," ***International Workshop on Discrete Event Systems***, pp. 355-360, Xi'an, China, May 30 - June 1, 2016.

[10] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Efficient and optimal scheduling of time-constrained hybrid multi-cluster tools in semiconductor industry," ***IEEE International Conference on Networking, Sensing and Control***, Mexico City, Mexico, April 28-30, 2016.

2015

[11] C. R. Pan, M. C. Zhou, and **Y. Qiao**, "How to start-up dual-arm cluster tools involving a wafer revisiting process," ***IEEE International Conference on Automation Science and Engineering***, pp. 1194-1199, Gothenburg, Sweden, Aug. 24-28, 2015.

[12] C. R. Pan, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Modeling and scheduling of cluster tools dealing with wafer revisiting: a brief review," ***IEEE International Conference on Networking, Sensing and Control***, pp. 271-276, Howard Civil Service International House, Taiwan, April 9-11, 2015.

[13] Q. H. Zhu, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Scheduling close-down processes subject to wafer residency constraints for single-arm cluster tools," ***IEEE International Conference on Systems, Man & Cybernetics***, pp. 521-526, Kowloon, Hong Kong, Oct. 9-12, 2015.

[14] Q. H. Zhu, **Y. Qiao**, and M. C. Zhou, "Petri net modeling and one-wafer scheduling of single-arm tree-like multi-cluster tools," ***IEEE International Conference on Automation Science and Engineering***, pp. 292-297, Gothenburg, Sweden, Aug. 24-28, 2015.

2014

[15] **Y. Qiao**, N. Q. Wu, C. R. Pan, and M. C. Zhou, "A novel failure response policy for single-arm cluster tools with residency time constraints," ***IEEE International Conference on Systems, Man & Cybernetics***, pp. 120-126, San Diego, CA, USA, Oct. 5-8, 2014.

[16] **Y. Qiao**, N. Q. Wu, C. R. Pan, and M. C. Zhou, "Petri net-based response policies to process module failure in time-constrained single-arm cluster tools," ***IEEE International Conference on Networking, Sensing and Control***, pp. 144-149, Miami, FL, USA, April 7-9, 2014.

[17] C. R. Pan, M. C. Zhou, **Y. Qiao**, and N. Q. Wu, "Simulation modeling and visualization of start-up transient processes of dual-arm cluster tools with wafer revisiting," ***IEEE International Conference on Systems, Man & Cybernetics***, pp. 133-138, San Diego, CA, USA, Oct. 5-8, 2014.

[18] Q. H. Zhu, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Modeling and schedulability analysis of single-arm multi-cluster tools with residency time constraints via Petri nets," ***IEEE International Conference on Automation Science and Engineering***, pp. 81-86, Taipei, Taiwan, August 18-22, 2014.

[19] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal scheduling of single-arm multi-cluster tools with two-space buffering modules," ***IEEE International Conference on Automation Science and Engineering***, pp. 75-80, Taipei, Taiwan, August 18-22, 2014.

[20] F. J. Yang, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Optimal one-wafer cyclic scheduling analysis of hybrid multi-cluster tools with one-space buffering module," ***IEEE International Conference on Robotics and Automation***, pp. 3279-3284, Hong Kong Convention and Exhibition Center, Hong Kong, China, May 31 - June 7, 2014.

2013

[21] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Scheduling of time constrained dual-arm cluster tools with wafer revisiting," ***IEEE International Conference on Automation Science and Engineering***, pp. 868-873, Madison, Wisconsin, USA, August 17-21, 2013.

[22] **Y. Qiao**, N. Q. Wu, M. C. Zhou, and Q. Y. Dai, "Petri net-based scheduling analysis of dual-arm cluster tools subject to wafer revisiting and residency time constraints," ***IEEE International Conference on Networking, Sensing and Control***, pp. 252-257, Paris-Evry, France, April 10-12, 2013.

[23] Q. H. Zhu, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Petri net modeling and one-wafer scheduling of single-arm multi-cluster tools," ***IEEE International Conference on Automation Science and Engineering***, pp. 862-867, Madison, Wisconsin, USA, August 17-21, 2013.

[24] Q. H. Zhu, N. Q. Wu, **Y. Qiao**, and M. C. Zhou, "Scheduling of single-arm multi-cluster tools to achieve the minimum cycle time," ***IEEE International Conference on Robotics and Automation***, pp. 3555-3560, Karlsruhe, Germany, May 6-10, 2013.

2012

[25] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Petri net-based scheduling analysis of dual-arm cluster tools with wafer revisiting," ***IEEE International Conference on Automation Science and Engineering***, pp. 206-211, Seoul, Korea, August 20-24, 2012.

[26] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Petri net-based real-time scheduling of time-constrained single-arm cluster tools with activity time variation," ***IEEE International Conference on Robotics and Automation***, pp. 5056-5061, RiverCentre, Saint Paul, Minnesota, USA, May 14-18, 2012.

[27] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Real-time control policy for single-arm cluster tools with residency time constraints and activity time variation by using Petri net," ***IEEE International Conference on Networking, Sensing and Control***, pp. 34-39, Beijing, China, April 11-14, 2012.

2011

[28] **Y. Qiao**, N. Q. Wu, and M. C. Zhou, "Modeling and analysis of dual-arm cluster tools for wafer fabrication with revisiting," ***IEEE International Conference on Automation Science and Engineering***, pp. 90-95, Trieste, Italy, August 24-27, 2011.

Patents:

[1] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, Z. W. Li, Cluster tool apparatus and a method of controlling a cluster tool apparatus, ***US Patent***, 10,643,873 B2, Application No.: 15/263,615, May 5, 2020.

[2] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, System and method for determining an optimal schedule of a production line, ***US Patent***, 10,101,721 B2, Application No.: 14/920,026, October 16, 2018.

[3] **Y. Qiao**, M. C. Zhou, N. Q. Wu, Z. W. Li, and Q. H. Zhu, Cluster tool apparatus and a method of controlling a cluster tool apparatus, ***US Patent***, 10,134,613 B2, Application No.: 15/272,706, November 20, 2018.

[4] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, Petri net-based optimal one-wafer cyclic scheduling of treelike hybrid multi-cluster tools, ***US Patent***, 10,073,444 B2, Application No.: 62/221,038, September 11, 2018.

[5] N. Q. Wu, Q. H. Zhu, **Y. Qiao**, and M. C. Zhou, Optimal one-wafer scheduling of single-arm multi-cluster tools with tree-like topology, ***US Patent***, 10,001,773 B2, Application No.: 14/918,577, June 19, 2018.

[6] N. Q. Wu, Q. H. Zhu, M. C. Zhou, and **Y. Qiao**, Optimally scheduling of close-down process for single-arm cluster tools with wafer residency time constraints, ***US Patent***, 10,001,772 B2, Application No.: 14/918,564, June 19, 2018.

[7] N. Q. Wu, **Y. Qiao**, and M. C. Zhou, Scheduling start-up process for time-constrained single-arm cluster tools, ***US Patent***, 9,618,930 B1, Application NO.: 14/918,557, April 11, 2017.

[8] N. Q. Wu, F. J. Yang, **Y. Qiao**, M. C. Zhou, and Z. W. Li, A cluster tool apparatus and a method of controlling a cluster tool apparatus (Optimal scheduling of transport-bound single-arm cluster tools with wafer residency time constraint), ***Australia Patent***, 2016101610, 2016.

[9] **Y. Qiao**, M. C. Zhou, N. Q. Wu, Z. W. Li, and Q. H. Zhu, A cluster tool apparatus and a method of controlling a cluster tool apparatus (Linear programming approaches to close-down process optimization of single-arm cluster tools), ***Australia Patent***, 2016101706, 2016.

[10] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, Method for scheduling single-arm cluster tools with wafer revisiting and residency time constraints, ***Australia Patent***, 2015100138, 2015.

[11] N. Q. Wu, M. C. Zhou, C. R. Pan, and **Y. Qiao**, Optimization of start-up transient processes for dual-armed cluster tools with wafer revisiting, ***Australia Patent***, 2015100137, 2015.

[12] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, A system and method for determining an optimized schedule of a production line, ***Australia Patent***, 2015101569, 2015.

[13] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, Method for scheduling single-arm cluster tools with wafer revisiting and residency time constraints, ***US Patent***, 9,223,307 B1, Application No. 14/639,980, Dec. 29, 2015.

[14] N. Q. Wu, **Y. Qiao**, and M. C. Zhou, A method for responding to process module failure in residency time-constrained single-arm cluster tools, ***Australia Patent***, 2014100522, 2014.

[15] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, One-wafer cyclic scheduling of single-arm multi-cluster tools with two-space buffering modules, ***Australia Patent***, 2014100513, 2014.

[16] N. Q. Wu, F. J. Yang, **Y. Qiao**, and M. C. Zhou, One-wafer cyclic scheduling of hybrid multi-cluster

tools in semiconductor manufacturing, ***Australia Patent***, 2014100514, 2014.

[17] N. Q. Wu, F. J. Yang, and **Y. Qiao**, One-wafer cyclic scheduling for time constrained process-dominant multi-cluster tools, ***Australia Patent***, 2014100480, 2014.