

# Xifeng Wang

Electrical Engineering and Computer Science Dept., University of Michigan  
1301 Beal Ave., Ann Arbor, MI 48109-2122, USA  
xifwang@umich.edu

## Education Background

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03/2019-present	University of Michigan Post-doctoral fellow, Electrical Engineering	Advisor: Prof. Mark J. Kushner
09/2017-03/2019	Princeton University Joint Ph.D., Plasma Physics	Advisor: Prof. Igor Kaganovich
09/2015-03/2019	Dalian University of Technology Ph.D., Plasma Physics	Advisor: Prof. Yuanhong Song
09/2012-09/2015	Dalian University of Technology M.S., Plasma Physics	Advisor: Prof. Yuanhong Song
09/2008-09/2012	Shanxi Datong University B.S., Physics	

## Research Projects

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03/2019-present	Feature scale of line-space/hole-contact plasma precision etching – <i>Sponsored by Tokyo Electron Ltd.</i> <ul style="list-style-type: none"><li>• Investigate feature properties of SiO<sub>2</sub> etch by using CCP source.</li><li>• Study feature scale properties of ARC etch by using ALE method.</li><li>• Feature scale properties in oxide etch by using pulsed RF CCP mixtures.</li></ul> Advisor: Prof. Mark J. Kushner
05/2018-03/2019	Fundamental understanding of electron beam generated plasmas – <i>Sponsored by Samsung Electronics.</i> <ul style="list-style-type: none"><li>• Participate in chemical evaluation of CF<sub>4</sub> and C<sub>4</sub>F<sub>8</sub> plasmas by using <b>Global model</b>.</li><li>• Improving species densities by controlling the hot electrons temperature.</li></ul> Advisor: Prof. Igor Kaganovich
09/2017-05/2018	Fundamental understanding of plasma diffusion/surface SEE properties in CCP discharge <ul style="list-style-type: none"><li>• Study and use <b>EDPIC</b> code to simulate RF CCP Ar/He plasmas.</li><li>• Investigate the ion free diffusion process by coding a 1D fluid model.</li><li>• Developing the theoretical analytical model of CCP discharge.</li></ul> Advisor: Prof. Igor Kaganovich
09/2015-09/2018	I. Numerical investigation on pulse modulated radio-frequency capacitively coupled discharge in reactive gases <ul style="list-style-type: none"><li>• Study electron transient behaviors of power ignition and species diffusion properties during afterglow in pulsed RF CCP SiH<sub>4</sub>/Ar and Ar mixtures.</li><li>• Parametric investigation of plasma properties in pulsed RF CCP discharges.</li></ul> II. Hybrid simulation and experimental validation on discharge mechanism in electronegative gases in CCP driven by tailored waveform <ul style="list-style-type: none"><li>• Simulate electron heating mechanisms in RF CCP discharge by fluid/MC hybrid model.</li><li>• Study electric field reversal impacts on electron heating in RF CCP SiH<sub>4</sub>/Ar mixtures.</li></ul>

Advisors: Prof. Yuanhong Song

09/2012-09/2015 Plasma processing chamber simulation and experiment evaluation

- Build **fluid/electron-MC hybrid model** for CCP source
- Simulate RF CCP SiH<sub>4</sub> mixture discharges by using **2D fluid model**.

Advisors: Prof. Yuanhong Song, Prof. Younian Wang

## Conference Presentations

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1. **X. F. Wang**, Y. H. Song, Y. N. Wang and I. Kaganovich, Evaluation of gas phase and wall surface chemical reactions in CF<sub>4</sub> and C<sub>4</sub>F<sub>8</sub> plasmas, *71<sup>st</sup> Gaseous Electronics Conference*, Portland, OR, Nov. 2018.
2. **X. F. Wang**, Y. H. Song, Y. N. Wang and I. Kaganovich, Investigations of EEDFs and plasma compositions in SiH<sub>4</sub>/Ar and CF<sub>4</sub> plasmas, *Gordon Research Conference on Plasma Processing Science*, Smithfield, RI, Aug. 2018.
3. **X. F. Wang**, Y. H. Song, Y. N. Wang and I. Kaganovich, Investigations of EEDFs and plasma compositions in SiH<sub>4</sub>/Ar and CF<sub>4</sub> plasmas, *9<sup>th</sup> Annual Meeting DOE Center for Predictive Control of Plasma Kinetics*, Bethesda, MD, May 2018.
4. **X. F. Wang**, W. Z. Jia, Y. H. Song and Y. N. Wang, Spatiotemporal analysis of the electric field reversals in capacitively coupled SiH<sub>4</sub>/Ar RF discharge, *70<sup>th</sup> Gaseous Electronics Conference*, Pittsburgh, PA, Nov. 2017.
5. **X. F. Wang**, Y. H. Song and Y. N. Wang, Hybrid Modeling of SiH<sub>4</sub>/Ar Discharge in a Pulse Modulated RF Capacitively Coupled Plasma, *68<sup>th</sup> Gaseous Electronics Conference*, Honolulu, HI, Oct. 2015.
6. **X. F. Wang**, Y. H. Song, Z. L. Dai and Y. N. Wang, Spatio-temporal evolution of electron and ion kinetics in pulsed SiH<sub>4</sub>/Ar discharge, *13<sup>th</sup> Asia-Pacific Conference on Plasma Science and Technology*, Shanghai, China.

## Publications

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1. **X. F. Wang**, Y. H. Song, S. X. Zhao, Z. L. Dai, Y. N. Wang. Hybrid Simulation of Duty Cycle Influences on Pulse Modulated RF SiH<sub>4</sub>/Ar Discharge [J]. *Plasma Sci. and Tech.*, 2016, 18(4):394-399.
2. **X. F. Wang**, W. Z. Jia, Y. H. Song, Y. Y. Zhang, Z. L. Dai, and Y. N. Wang. "Hybrid simulation of electron energy distributions and plasma characteristics in pulsed RF CCP sustained in Ar and SiH<sub>4</sub>/Ar discharges", *Phys. Plasmas*, 2017, 24: 113503.
3. W. Z. Jia, **X. F. Wang**, Y. H. Song, and Y. N. Wang. "Two-dimensional fluid simulation on transient behavior and plasma uniformity in pulsed RF CCP sustained in SiH<sub>4</sub>/N<sub>2</sub>/O<sub>2</sub>", *J. Phys. D: Appl. Phys.*, 2017, 50:165206.
4. W. Z. Jia, R. Q. Liu, **X. F. Wang**, X. M. Liu, Y. H. Song, and Y. N. Wang. "Two-dimensional fluid simulation of a radio frequency capacitively coupled plasma in SiH<sub>4</sub>/N<sub>2</sub>/O<sub>2</sub>", *Phys. Plasmas*, 2017, 24: 113503.
5. W. Z. Jia, Q. Z. Zhang, **X. F. Wang**, Y. H. Song, Y. Y. Zhang and Y. N. Wang. "Effect of dust particle size on the plasma characteristics in a radio frequency capacitively coupled silane plasma", *J. Phys. D: Appl. Phys.*, 2018, 52(1): 015206.