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XIAOXUE WANG

EDUCATION

Ph.D.	Massachusetts Institute of Technology Department of Chemical Engineering Thesis Advisor: Prof. Karen K. Gleason Thesis title: Structure-Property Engineering and Device Fabrication of Conjugated Polymers by Chemical Vapor Deposition Minor in Electrical Engineering	2018.06
M.S. CEP Master of Science in Chemical Engineering Practice	Massachusetts Institute of Technology Department of Chemical Engineering	2018.06
B.S.	Tsinghua University Department of Chemical Engineering, <i>Graduated with highest distinction</i>	2012.06

PROFESSIONAL EXPERIENCE

Assistant Professor (tenure-track)	The Ohio State University Department of Chemical and Biomolecular Engineering Core Faculty Member of Sustainability Institute	2019.08 – Present Columbus, OH
Postdoctoral Associate	Massachusetts Institute of Technology Department of Chemical Engineering Advisor: Prof. Klavs F. Jensen Topic: Applying reinforcement learning (RL) and Monte Carlo Tree Search(MCTS) to boost synthesis planning for organic small molecules	2018.08 - 2019.08 Cambridge, MA
Internship	Novartis	2014.01 - 2014.03 Basel, Switzerland

RESEARCH INTERESTS

My lab focuses on using a synergistic approach to boost the innovations in soft electronic materials and devices. Specifically, my research centers around:

- structure-property engineering of electronic polymers to advance the fundamental understanding of charge and heat transport mechanisms
- fabrication of advanced electronic devices for energy efficient artificial intelligence (AI) based on conjugated polymers
- applying machine learning to boost the design of green synthetic pathways for drug-like organic molecules and novel electronic materials

Chemical vapor deposition (CVD) technology for polymers is a unique tool used in my lab for material synthesis, molecular engineering and device fabrication.

Keywords: soft materials, machine learning, energy efficient AI, smart manufacturing, CVD.

SELECTED ACADEMIC AWARDS

• Ralph E. Powe Junior Faculty Enhancement Award	2021
• OSU President's Research Excellence (PRE) Accelerator Award	2021
• Exploratory Materials Research Grant within The Ohio State University Materials Research Seed Grant Program (MRS GP)	2021
• Materials Research Society Graduate Student Award	2018
• MIT Chemical Engineering Practice School Fellowship	2014

- MIT Robert T. Haslam Fellowship 2012
- Distinguished Graduates with Highest Honor (67/3000, Tsinghua) 2012
- Scholarship in Memorial of December 9th Movement (1/480, Tsinghua), 2011
- Chinese National Scholarship (1%) 2010
- Total S.A. Scholarship (1%, Tsinghua) 2009

ACADEMIC PUBLICATIONS

BOOK CHAPTER PUBLICATIONS

[1] Gleason, K. and **Wang, X.** Oxidative Chemical Vapor Deposition for Conjugated Polymers: Theory and Applications. **Handbook of Conducting Polymers, Fourth Edition, Two-Volume Set, CRC Press/Taylor & Francis, 2019**, DOI: 10.1201/9781315159522-15 (Classic reference book of conjugated polymers)

JOURNAL PUBLICATIONS

[2] **Wang, X.**; Qian, Y.; Gao, H.; Coley, C.; Mo, Y.; Barzilay, R.; Jensen, K. Towards Efficient Discovery of Green Synthetic Pathways with Monte Carlo Tree Search and Reinforcement Learning, **Chemical Science**, 2020, 11, 10959-10972

[3] **Wang, X.**; Zhang, X.; Sun, L.; Lee, D.; Lee, S.; Wang, M.; Zhao, J.; Shao-Horn, Y.; Dinca, M.; Palacios, T.; Gleason, K. High Electrical Conductivity and Carrier Mobility in oCVD PEDOT Thin Films by Engineered Crystallization and Acid Treatment, **Science Advances**, 4.9 (2018): eaat5780

[4] Xu, Y.*; **Wang, X.***; Zhou, J.; Song, B.; Jiang, Z.; Lee, E.; Huberman, S.; Gleason, K.; Chen, G. Molecular Engineered Conjugated Polymer with High Thermal Conductivity (*authors contributed equally), **Science Advances**, 4.3 (2018): eaar3031. (Featured by MIT News, Machine Design, Power Electronics, Manufacturing, etc.)

[5] Wang, M.*; **Wang, X.***; Moni, P.*; Liu, A.; Kim, D.; Jo, W.; Sojoudi, H.; Gleason, K. CVD Polymers for Devices and Device Fabrication (*authors contributed equally), **Advanced Materials**, 29.11 (2017): 1604606

[6] **Wang, X.**; Ermez, S.; Goktas, H.; Gradečak, S.; Gleason, K. Room Temperature Sensing Achieved by GaAs nanowires and oCVD Polymer Coating, **Macromolecular Rapid Communications**, 38.12 (2017): 1700055

[7] **Wang, X.**; Ugur, A.; Goktas, H.; Chen, Nan.; Wang, M.; Lachman, N.; Kalfon-Cohen, E.; Fang, W.; Wardle, B.; Gleason, K. Room Temperature Resistive Volatile Organic Compound Sensing Material based on a Hybrid Structure of Vertically Aligned Carbon Nanotubes and Conformal oCVD/iCVD Polymer Coatings, **ACS Sensors**, 1.4 (2016): 374-383.

[8] **Wang, X.**; Hou, S.; Goktas, H.; Kovacic, P.; Yaul, F.; Paidimarri, A.; Ickes, N.; Chandrakasan, A.; Gleason, K. Small-area, Resistive Volatile Organic Compound (VOC) Sensors using Metal-polymer Hybrid Film based on Oxidative Chemical Vapor Deposition (oCVD), **ACS Applied Materials & Interfaces**, 7.30(2015): 16213–16222

[9] Zhang, X.; Grajal, J.; Vazquez-Roy, J.; Ujwal, R.; **Wang, X.**; Chern, W.; Zhou, L.; Lin, Y.; Shen, P.; Ji, X.; Ling, X.; Zubair, A.; Zhang, Y.; Wang, H.; Dubey, M.; Kong, J.; Dresselhaus, M. S.; Palacios, T. Two-dimensional MoS₂-enabled flexible rectenna for Wi-Fi-band wireless energy harvesting, **Nature**, 566.7744 (2019): 368.

[10] Zhou, Y.; **Wang, X.**; Acauan, L.; Kalfon-Cohen, E.; Ni, X.; Stein, Y.; Gleason, K.K.; Wardle, B.L. Ultrahigh-Areal-Capacitance Flexible Supercapacitor Electrodes Enabled by Conformal P3MT on Horizontally Aligned Carbon-Nanotube Arrays. **Advanced Materials** (2019): 1901916. (Featured by Frontiers of Polymer Science)

[11] Goktas, H.; **Wang, X.**; Boscher, N.; Torosian, S.; Gleason, K. Functionalizable and Electrically Conductive Thin Films Formed by Oxidative Chemical Vapor Deposition (oCVD) from Mixtures of 3-thiopheneethanol (3TE) and Ethylene Dioxythiophene (EDOT). **Journal of Materials Chemistry C**, 4.16 (2016): 3403-3414.

[12] Goktas, H.; **Wang, X.**; Ugur, A.; Gleason, K. Water-Assisted Vapor Deposition of PEDOT Thin Film. **Macromolecular Rapid Communications**, 36.13 (2015): 1283-1289

[13] Chen, N.; **Wang, X.**; Gleason, K. Conformal Single-layer Encapsulation of PEDOT at Low Substrate Temperature. **Applied Surface Science** 323 (2014): 2-6.

[14] Zhang, X.; Grajal, J.; **Wang, X.**; Ujwal, R.; Xiang, J.; Shen, P.; Zhang, Y.; Kong, J.; Dresselhaus, M. S.; Palacios, T. MoS₂ Phase-junction-based Schottky Diodes for RF Electronics. **2018 IEEE/MTT-S International Microwave Symposium-IMS** (pp. 345-347) IEEE, 2018.

[15] Wang, M.; Zhao, J.; **Wang, X.**; Liu, A.; Gleason, K. Recent Progress on Submicron Gas-selective Polymeric Membranes. **Journal of Materials Chemistry A**, 5.19(2017): 8860-8886

- [16] Chen, N.; Kovacic, P.; Howden, R.; **Wang, X.**; Lee, S.; Gleason, K. Low Substrate Temperature Encapsulation for Flexible Electrodes and Organic Photovoltaics. **Advanced Energy Materials** 5.6 (2015): 1401442
- [17] Mao, X.; Liu, A.; Tian, W.; **Wang, X.**; Gleason, K. K.; Hatton, T. A. Enhancing Performance Stability of Electrochemically Active Polymers by Vapor - Deposited Organic Networks. **Advanced Functional Materials** 28.10 (2018): 1706028
- [18] Krieg, L.; Meierhofer, F.; Gorny, S.; Leis, S.; Splith, D.; Zhang, Z.; von Wenckstern, H.; Grundmann, M.; **Wang, X.**; Hartmann, J.; Margenfeld, C.; Clavero, I.; Avramescu, A.; Schimpke, T.; Scholz, D.; Lugauer, H.; Strassburg, M.; Jungclaus, J.; Bornemann, S.; Spende, H.; Waag, A.; Gleason, K.; Voss, T. Towards 3D hybrid inorganic/organic optoelectronics: light emission and electronic transport properties of GaN/oCVD-PEDOT structures. **Nature Communications** 11.1 (2020): 1-10.
- [19] Krieg, L.; Zhang, Z.; Splith, D.; von Wenckstern, H.; Grundmann, M.; **Wang, X.**; Gleason, K.; Voss, T. Controlled formation of Schottky diodes on n-doped ZnO layers by deposition of p-conductive polymer layers with oxidative chemical vapor deposition. **Nano Express** 1.1 (2020): 010013.
- [20] Hou, S.; Wang, J.; **Wang, X.**; Chen, H.; Xiang, L. Effect of Mg²⁺ on Hydrothermal Formation of α -CaSO₄·0.5 H₂O Whiskers with High Aspect Ratios. **Langmuir** 30.32 (2014): 9804-9810.
- [21] Reeja-Jayan, B.; Kovacic, P.; Yang, R.; Sojoudi, H.; Ugur, A.; Kim, D.; Petruczok, C.; **Wang, X.**; Liu, A.; Gleason, K. A Route towards Sustainability through Engineered Polymeric Interfaces. **Advanced Materials Interfaces** 1.4 (2014): 1400117
- [22] Coclite, A.; Howden, R.; Borrelli, D.; Petruczok, C.; Yang, R.; Yague, J.; Ugur, A.; Chen, N.; Lee, S.; Jo, W.; Liu, A.; **Wang, X.**; Gleason, K. 25th Anniversary Article: CVD Polymers: A New Paradigm for Surface Modification and Device Fabrication. **Advanced Materials** 25.38 (2013): 5392-5423.

SELECTED CONFERENCE PUBLICATIONS

- [23] **Wang, X.**, et al. Enhancing the Key Properties of CVD Polymer Thin Films for Device Fabrication. **American Vacuum Society (AVS) 66th International Symposium & Exhibition**, 2019, Columbus, OH, USA
- [24] **Wang, X.**, et al. Reinforcement Learning: Towards More Efficient Synthesis Planning and Greener Processes. **BASF Northeast Research Alliance (NORA) Collaboration Days**, 2019, Amherst, MA, USA
- [25] **Wang, X.**, et al. Boosting Synthesis Planning with Reinforcement Learning., **Machine Learning for Pharmaceutical Discovery and Synthesis (MLPDS) Consortium Meeting**, 2019, Cambridge, MA, USA
- [26] **Wang, X.**, et al. Ultrahigh Electrical Conductivity of oCVD PEDOT Thin Films and the Wafer Scale Fabrication of the 13.6MHz Rectifiers based on the PEDOT-Si Diode. **Materials Research Society (MRS) Spring Meeting**, 2018, Phoenix, AZ, USA.
- [27] **Wang, X.**, et al. Room Temperature Sensing Based on Initiated CVD Coated Carbon Nanotube Arrays. **Hot-wire Chemical Vapor Deposition (HWCVD) 9**, 2016, Philadelphia, PA
- [28] **Wang, X.**, et al Au/conducting polymer volatile organic compounds (VOC) sensors based on oxidative chemical vapor deposition (oCVD), **American Institute of Chemical Engineers (AIChE) Annual Meeting**, 2015, Saltlake City, UT, USA
- [29] **Wang, X.**, et al. Novel Resistive Volatile Organic Compound (VOC) Sensor Based on a Composite Structure of Vertically Aligned Carbon Nanotubes and oCVD/iCVD Polymer Films, **American Chemical Society (ACS) National Meeting**, 2015, Boston, MA, USA
- [30] **Wang, X.**, et al. Volatile Organic Compounds sensing with oxidative CVD, **Microsystems Technology Laboratories (MTL)>30 symposium**, 2014, Cambridge, MA, USA

PATENTS

Gleason, K.; Wardle, B.; Cohen, E.; Zhou, Y.; **Wang, X.**; Stein, Y. "SUPERCAPACITORS AND OTHER ELECTRODES AND METHODS FOR MAKING AND USING SAME" US Patent Application No.: 15/931,987

Chen, G.; Gleason, K.; Xu, Y.; **Wang, X.** "MOLECULAR ENGINEERED CONJUGATED POLYMER WITH HIGH THERMAL CONDUCTIVITY" U.S. Patent Application No.: 16/250,717

ACADEMIC SERVICE

Funding Review Panelist for U.S. National Science Foundation (NSF) 2020 and 2021

Peer Review service for academic journals, including Science, Science Advances, Science Robotics, Advanced Materials, Nano Letters, ACS Applied Polymer Materials, Advanced Materials Interfaces, Applied Surface Science.

Session Chair for American Institute of Chemical Engineers(AIChE) Annual Meeting 2020 and 2021

Committee Member, Ohio State University, Department of Chemical and Biomolecular Engineering, Diversity Committee

ONGOING PROJECTS

“Boosting Neuromorphic Computing Using Chemical Vapor Deposition Polymers” funded by Exploratory Materials Research Grant within the Ohio State University Materials Research Seed Grant Program, leading PI.

“AI-Powered Green Synthesis Pathway Planning for Drug Manufacturing” funded by OSU President's Research Excellence (PRE) Accelerator Award, leading PI.

“Boosting AI's Energy Efficiency with Organic Artificial Synapses” funded by Oak Ridge Associated Universities (ORAU) Ralph E. Powe Junior Faculty Enhancement Award, leading PI.

“Chemical Vapor Deposition Synthesis of Polymeric Organic Semiconductor” funded by OSU Institute for Materials Research, leading PI.

“Chemical Vapor Deposition Growth of Channel Materials and Electrolytes for Organic Electrochemical Transistors” funded by OSU Institute for Materials Research, leading PI.