

SUSAN FULLERTON

Associate Professor and Bicentennial Board of Visitors Faculty Fellow

Chemical and Petroleum Engineering, University of Pittsburgh

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A. EDUCATION

The Pennsylvania State University, University Park, PA USA

Ph.D., Chemical Engineering, August 2009

Dissertation Topic: *Nanoparticle-filled solid polymer electrolytes for rechargeable lithium-ion batteries*

B.S., Chemical Engineering, December 2002 (with distinction)

B. PROFESSIONAL APPOINTMENTS

University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Department of Chemical and Petroleum Engineering

Associate Professor with Tenure

Fall 2020 - present

Vice Chair for Graduate Education

May 2020 - present

Bicentennial Board of Visitors Faculty Fellow

Fall 2019 - present

Assistant Professor

Fall 2015 - Fall 2020

Department of Electrical and Computer Engineering

Courtesy faculty appointment

Fall 2017 - present

University of Notre Dame, Notre Dame, Indiana, USA

Research Assistant Professor (non-tenure stream, member of graduate committee)

Department of Electrical Engineering

Fall 2009 - Fall 2015

Notre Dame Center for Nano Science and Technology (ND*nano*)

C. PEER-REVIEWED JOURNAL PUBLICATIONS

H index = 20 (Google Scholar); 16 (publons) as of 1/13/21

Total number of papers: 50; Fullerton as directing author: 18

Total Citations: 1562 (Google Scholar) 1136 (publons)

Summary of Affiliations: papers 14-50 at Pitt; 6-13 at Notre Dame; 1-5 at Penn State

Notation: **Directing author*; †*Pitt PhD student*; ‡*Undergraduate*

University of Pittsburgh

50. Woepfel, A.†; Xu, K.; Kozhakhmetov, A.; Awate, S.‡; Robinson, J.A.; **Fullerton-Shirey, S.K.*** “Single versus Dual Ion Conductors for Electric Double Layer Gating: Finite-Element Modeling and Hall-effect Measurements” *ACS Applied Materials and Interfaces* 12, 36, 40850–40858 **2020**. Impact factor 8.8.

49. Lin, Y.-C.; Bersch, B.M.; Addou, R.; Xu, K.; Wang, Q.; Smyth, C.M.; Jariwala, B.; Walker II, R.C.; **Fullerton-Shirey, S.K.**; Kim, M.J.; Wallace, R.M.; Robinson, J.A.* “Modification of the Electronic Transport in Atomically Thin WSe₂ by Oxidation” *Advanced Materials Interfaces* 2000422 **2020**. Impact factor 5.0.

48. Fathipour, S.; Paletti, P.; **Fullerton-Shirey, S.K.**; Seabaugh, A.C.* “Electric double layer p-i-n junctions in WSe₂” *Scientific Reports* 10, 12890 **2020**. Impact factor 4.0.

47. Subramanian, S.; Xu, K.; Wang, Y.X.; Moser, S.; Simonson, N.; Deng, D.; Crespi, V.; **Fullerton-Shirey, S.K.**; Robinson, J.* “Tuning transport across MoS₂/graphene interfaces via as-grown lateral

heterostructures” *npj 2D Materials and Applications* 4, 9 **2020**. Impact factor 9.3. **Contribution:** Electrolyte-gated device measurements and analysis; manuscript preparation.

46. **(Invited review)** Xu, K. and **Fullerton-Shirey, S.K.*** “Electric-Double-Layer-Gated Transistors Based on Two-Dimensional Crystals: Recent Approaches and Advances” *Journal of Physics: Materials* 3, 3 **2020**. Impact factor N/A.

45. Asghari Heidarlou, M.; Paletti, P.; Jariwala, B.; Robinson, J.A.; **Fullerton-Shirey, S.K.;** Seabaugh, A.C.* “WSe₂-on-sapphire field-effect transistors grown by chemical vapor deposition” *IEEE Transactions on Electron Devices* 67, 1839 **2020**. Impact factor 2.62 **Contribution:** Electrolyte-gating; manuscript preparation.

44. Arora, S.; Liang, J.†; **Fullerton-Shirey, S.K.;** Laaser, J.E.* “Triggerable Ion Release in Polymerized Ionic Liquids Containing Thermally-Labile Diels-Alder Linkages” *ACS Materials Letters* 2, 4, 331-335 **2020**. Impact factor N/A. **Contribution:** Directed electrolyte-gated capacitor measurements and analysis; contributed to manuscript preparation.

43. **(Invited paper)** Liang, J.†; Xu, K.; Arora, S.; Laaser, J.E.; **Fullerton-Shirey, S.K.*** “Ion-locking in solid polymer electrolytes for reconfigurable gate-less lateral graphene p-n junctions” *Materials (MDPI)* 13(5), 1089 **2020**. Impact factor 2.7. **Contribution:** Directed research and guided manuscript preparation.

42. Kozhakhmetov, A. Nasr, J.; Zhang, F.; Xu, K.; Briggs, N.; Addou, R.; Wallace, R.; **Fullerton-Shirey, S. K.;** Terrones, M.; Das, S.; Robinson, J. “Scalable BEOL Compatible Two-Dimensional Tungsten Diselenide” *2D Materials*, 7 015029 **2020** Impact factor 7.3
Contribution: Directed ion-gated device measurements and analysis; manuscript preparation.

41. Chao, Z.;† Sezginel, K.B.;† Xu, K.; Crouch, G.M.; Gray, A.E.;† Wilmer, C.E.; Bohn, P.W.; Go, D.B. **Fullerton-Shirey, S.K.*** “Silver Nanofilament Formation Dynamics in a Polymer-Ionic Liquid Thin Film by Direct-Write” *Advanced Functional Materials*, 907950 **2019** Impact factor 15.6.
Contribution: Directed research and guided manuscript preparation.

40. Liang, J.;† Xu, K.; Wu, M.; Hunt, B.; Wang W.; Cho, K.; **Fullerton-Shirey, S.K.*** “Molecularly thin all-solid-state non-volatile memory gated by a monolayer electrolyte” *Nano Letters* 19, 29, 8911-8919 **2019** Impact factor 12.
Contribution: Directed research and guided manuscript preparation.

39. Hwang, W.S.; Zhao, P.; Kim, S.G.; **Fullerton-Shirey, S.K.;** Yan, R.; Xing, H. Seabaugh, A.; Jena, D.* “Room-Temperature Graphene-Nanoribbon Tunneling Field-Effect Transistors” *npj 2D Materials and Applications*, 3,43 **2019** Impact factor: 9.3.
Contribution: Prepared electrolyte for ion-doping; manuscript preparation.

38. Sun, Z.; Beaumariage, J.; Xu, K.; Liang, J.; Hou, S.; Forrest, S.R.; **Fullerton-Shirey, S.K.;** Snoke, D.W.* “Electric-field-induced optical hysteresis in single-layer WSe₂” *Appl. Phys. Lett.* 115, 161103 **2019**. Impact factor 3.5. **Contribution:** Electrical measurements; manuscript preparation.

37. Xu, K.; Liang, J.;† Bostian, M.;† Woepfel, A.;† Ding, H.; Chao, Z.;† McKone, J.R.; Beckman, E.J.; **Fullerton-Shirey, S.K.*** “Electric double layer gated two-dimensional field-effect transistor using a single-ion conductor” *ACS Applied Materials and Interfaces* 11 (39) 35879 **2019**. Impact factor 8.8.
Contribution: Directed research, guided manuscript preparation; Xu & Liang co-first authors.

36. Paletti, P.; Yue, R.; Hinkle, C.; **Fullerton-Shirey, S.K.;** Seabaugh, A.* “Two-dimensional electric-double-layer Esaki diode” *npj 2D Materials and Applications* 3, 19 **2019**. Impact factor: 9.3
Contribution: Guidance on electrolyte gating; manuscript preparation.

35. Vasudevan, S.; **Fullerton-Shirey, S.K.*** “Effect of Nanoparticle Shape on the Electrical and Thermal Properties of Solid Polymer Electrolytes” *J. Phys. Chem. C*, 123, 10720 **2019**. IF 4.5.

Contribution: Directed research and guided manuscript preparation.

34. Han, D.; Crouch, G.M.; Chao, Z.;[‡] **Fullerton-Shirey, S.K.**, Go, D.; Bohn, P.W.* “Nanopore-templated silver nanoparticle arrays photopolymerized in zero-mode waveguides” *Frontiers in Chemistry*, 7, 2016, **2019**, Invited. Impact factor 4.0.

Contribution: Guidance on photopolymerized electrolyte; contributed to manuscript preparation.

33. Liang, J.;[‡] Xu, K.; Toncini, B.[†]; Bersch, B.; Robinson, J.; **Fullerton-Shirey, S.K.*** “Impact of post-lithography polymer residue on the electrical characteristics of MoS₂ and WSe₂ field effect transistors” *Advanced Materials Interfaces*, 1801321 **2018**. Impact factor 5.0.

Contribution: Directed research and guided manuscript preparation.

32. Xu, K.; Islam, M.M.; Guzman, D.M.; Seabaugh, A.; Strachan, A.; **Fullerton-Shirey, S.K.*** “Pulse Dynamics of Electric Double Layer Formation on All-Solid-State Graphene Field-Effect Transistors” *ACS Applied Materials and Interfaces* 10, 43166 **2018**. Impact factor 8.8.

Contribution: Directed research and guided manuscript preparation.

31. Zhang, K.; Bersch, B.M.; Zhang, F.; Briggs, N.C.; Subramanian, S.; Xu, K.; Chubarov, M.; Wang, K.; Lerach, J.O.; Redwing, J.M.; **Fullerton-Shirey, S.K.**; Terrones, M.; Robinson, J.A.* “Considerations for Utilizing Sodium Chloride in Epitaxial Molybdenum Disulfide” *ACS Applied Materials and Interfaces* 10, 40831 **2018**. Impact factor 8.8.

Contribution: Electrolyte-gated device measurements and analysis; manuscript preparation.

30. Chao, Z.;[‡] Radka, B.P.[†]; Xu, K.; Crouch, G. M.; Han, D. Go, D. B., Bohn, P. W., **Fullerton-Shirey, S.K.*** “Direct-write formation and dissolution of silver nanofilaments in ionic liquid-polymer electrolyte composites” *Small*, 1802023 **2018**. Impact factor 9.6.

Contribution: Directed research and guided manuscript preparation.

29. Zhang, K.; Bersch, B.; Joshi, J.; Addou, R.; Cormier, C.R.; Zhang, C.; Xu, K.; Briggs, N.C.; Wang, D.; Subramanian, S.; Cho, K.; **Fullerton-Shirey, S.**; Wallace, R.M.; Vora, P.M.; Robinson, J.* “Tuning the Electronic and Photonic Properties of Monolayer MoS₂ via In Situ Rhenium Substitutional Doping,” *Advanced Functional Materials*, 28, 7 **2018**. Impact factor 12.1

Contribution: Directed electrical device measurements and analysis; manuscript preparation.

28. Lin, Y.-C.; Jariwala, B.; Bersch, B.; Xu, K.; Nie, Y.; Wang, B.; Eichfeld, S.; Zhang, X.; Choudhury, T.; Pan, Y.; Addou, R.; Smyth, C.M.; Li, J.; Zhang, K.; Haque, M.; Fölsch, S.; Feenstra, R.; Wallace, R.M.; Cho, K.; **Fullerton-Shirey, S.**; Redwing, J.; Robinson, J.* “Realizing Large-Scale, Electronic-Grade Two-Dimensional Semiconductors,” *ACS Nano*, 12, 965-975 **2018**. Impact factor 12.

Contribution: Directed electrical device measurements and analysis; manuscript preparation.

27. Zhang, K.; Borys, N.J.; Bersch, B.M.; Bhimanapati, G.R.; Xu, K.; Wang, B.; Wang, K.; Labella, M.; Williams, T.A.; Haque, Md Al; Barnard, E.S.; **Fullerton-Shirey, S.K.**; Schuck P.; Robinson, J.* “Deconvoluting the Photonic and Electronic Response of 2D Materials: The Case of MoS₂” *Scientific Reports* 7, 16938 **2017**. Impact factor 4.3

Contribution: Directed electrical device measurements and analysis; manuscript preparation.

26. Subramaniana, S.; Deng, D.D.; Xu, K.; Simonson, N.; Wang, K.; Zhang, K.; Li, J.; Feenstra, R.; **Fullerton-Shirey, S.K.**; Robinson, J.A.* “Properties of synthetic epitaxial graphene/molybdenum disulfide lateral heterostructures” *Carbon*, **2017** 125, 551. Impact factor 6.2

Contribution: Directed electrical device measurements and analysis; manuscript preparation.

25. Li, H.; Xu, K.; Buchanan, B.[†]; Lu, H.; Lin, Y.-C.; Robinson, J.; Seabaugh, A.; **Fullerton-Shirey,**

S.K.* “Electric Double Layer Dynamics in Polyethylene Oxide LiClO₄ on Graphene Transistors” *J. Phys. Chem. C.*, **2017** 121, 16996. Impact factor 4.8

Contribution: Directed research and guided manuscript preparation.

24. Kinder, E.; Fuller, A.[†]; Lin, Y.-C.; Robinson, J.; **Fullerton-Shirey, S.K.*** “Increasing the room-temperature electric double layer retention time in two-dimensional crystal FETs” *ACS Applied Materials and Interfaces* **2017** 9, 25006. Impact factor 8.8

Contribution: Directed research and guided manuscript preparation.

23. Young, J.R.; Chilcote, M.; Barone, M.; Xu, J.; Katoch, Luo, J.K.; Mueller, S.; Asel, T.J.; **Fullerton-Shirey, S.K.**; Kawakami, R.; Gupta, J.A.; Brillson, L.J.; Johnston-Halperin, E.* “Uniform large-area growth of nanotemplated high-quality monolayer MoS₂” *Appl. Phys. Lett.*, **2017** 110, 263103. Impact factor 3.4

Contribution: Electrolyte for electrolyte gating of devices; manuscript preparation.

22. Xu, K.; Lu, H.; Kinder, E.; Seabaugh, A.; **Fullerton-Shirey, S.K.*** “Monolayer Solid State Electrolyte for Electric Double Layer Gating of Graphene Field-Effect Transistor” *ACS Nano* **2017** 11 (6), 5453. Impact factor 12

Contribution: Directed research and guided manuscript preparation.

21. Crouch, G.; Han, D.; **Fullerton-Shirey, S.K.**; Go, D.*; Bohn, P.* “Addressable Direct-Write Nanoscale Filament Formation and Dissolution by Nanoparticle-Mediated Bipolar Electrochemistry” *ACS Nano* **2017** 11 (5), 4976. Impact factor 12

Contribution: Co-developed experimental approach and directed polymer electrolyte effort; manuscript preparation.

20. Park, J.H.; Ravavar, L.; Kwak, I.; **Fullerton-Shirey, S.K.**; Choudhury, P.; Kummel, A.C.* “Growth Mode Transition from Monolayer by Monolayer to Bilayer by Bilayer in Molecularly Flat Titanyl Phthalocyanine Film” *J. Phys. Chem. C.* **2017** 121, 6721. Impact factor 4.8

Contribution: Contributed to TiOPc as seed layer; manuscript preparation.

19. Kahn, A.A.; Vigil, G.D.; Zhang, Y.; **Fullerton-Shirey, S.K.**; Howard, S.S.* “Silica-coated ruthenium-complex nanoprobe for two-photon oxygen microscopy in biological media” *Optical Materials Express* **2017** 7, 3. Impact factor 2.6

Contribution: Co-developed nanoprobe; manuscript preparation.

18. Wang, W.-H.; Gong, C.; Wang, W.; Kong, F.; Kim, H.; **Fullerton-Shirey, S.K.**; Seabaugh, A.; Cho, K.* “Energetics of metal ion adsorption on and diffusion through crown ethers: first principles study on two-dimensional electrolyte” *Solid State Ionics* **2017** 301, 176-181. Impact factor 2.1

Contribution: Co-contributed original idea for 2D electrolyte; manuscript preparation.

17. Fathipour, S.; Pandey, P.; **Fullerton-Shirey, S.**; Seabaugh, A.* “Electric-double-layer doping of WSe₂ field-effect transistors using polyethylene-oxide cesium perchlorate” *J. Appl. Phys.*, **2016** 120, 234902. Impact factor: 2.2

Contribution: Guided polymer electrolyte work and data analysis; manuscript preparation.

16. Lin, Z.; McCreary, A.; Briggs, N.; Subramanian, S.; Zhang, K.; Sun, Y.; Li, X.; Borys, N.; Yuan, H.; **Fullerton-Shirey, S.**; Chernikov, A.; Zhao, H.; McDonnell, S.; Lindenberg, A.; Xiao, K.; LeRoy, B.; Drndic, M.; Hwang, J.; Park, J.; Chhowalla, M.; Schaak, R.; Javey, A.; Hersam, M.; Robinson, J.; Terrones, M. “2D Materials Advances: From Large Scale Synthesis and Controlled Heterostructures to Improved Characterization Techniques, Defects and Applications” *2D Materials*, **2016** 3, 042001. Impact factor: 7.3 **Contribution:** Electrolyte doping of 2D materials (invited review).

15. Park, J.H.; Fathipour, S.; Kwak, I.; Sardashti, K.; Ahles, C.F. Wolf, S.F.; Edmonds, M.; Vishwanath, S.; Xing, H.G.; **Fullerton-Shirey, S.K.**; Seabaugh, A.; Kummel, A.C.* “Atomic Layer Deposition of Al₂O₃ on WSe₂ Functionalized by Titanyl Phthalocyanine” *ACS Nano*, **2016** 10, 6888-6896. Impact factor: 12

Contribution: Contributed to the development of TiOPc as seed layer; manuscript preparation.

14. Park, J.H.; Vishwanath, S.; Liu, X.; Zhou, H.; Eichfeld, S.M.; Fullerton-Shirey, S.K. Robinson, J.A.; Feenstra, R.M.; Furdyna, J.; Jena, D.; Xing, H.G.* Kummel, A.C.* “Scanning Tunneling Microscopy and Spectroscopy of Air Exposure Effects on Molecular Beam Epitaxy Grown WSe₂ Monolayers and Bilayers” *ACS Nano*, **2016** 10, 4258-4267. Impact factor: 12

Contribution: Chemical models of air oxidation; manuscript preparation.

University of Notre Dame

13. Park, J.H.; Movva, C.P.M.; Chagarov, E.; Sardashti, K.; Chou, H.; Kwak, I.; Hu, K.-T.; **Fullerton-Shirey, S.K.**, Choudhury, P.; Banerjee, S.K.; Kummel, A.C.* “In-Situ Observation of Initial Stage in Dielectric Growth, and Deposition of Ultrahigh Nucleation Density Dielectric on Two-Dimensional Surfaces” *Nano Lett.*, **2015**, 15, 6626-6633. Impact factor: 13.6

Contribution: Solution-casting of monolayers; contributed to manuscript preparation.

12. Lu, H.; Kwak, I.; Park, J.H.; O’Neill, K.; Furuyama, T.; Kobayashi, N.; Seabaugh, A.; Kummel, A.; **Fullerton-Shirey, S.K.*** “Solution-Cast Monolayers of Cobalt Crown Ether Phthalocyanine on Highly Ordered Pyrolytic Graphite” *J. Physical Chemistry C*, **2015**, 119, 21992-22000. Impact factor: 4.8 **Contribution:** Directed research and guided manuscript preparation.

11. Wang, W.-H.; Gong, C.; Wang, W.; **Fullerton-Shirey, S.K.**; Seabaugh, A.; Cho, K*. “First-Principles Study of Crown Ether and Crown Ether-Li Complex Interactions with Graphene” *J. Physical Chemistry C*, **2015**, 119, 20016-20022. Impact factor: 4.8

Contribution: Motivated study by proposing crown ether as potential candidate for ion memory; discussed results and directions; contributed to manuscript preparation.

10. Xu, H.; Kinder, E. W.; Fathipour, S.; Seabaugh, A. C.; **Fullerton-Shirey, S.K.*** “Reconfigurable ion gating of 2H-MoTe₂ field-effect transistors using poly(ethylene oxide)-CsClO₄ solid polymer electrolyte” *ACS Nano*, **2015**, 9, 4900-4910. Impact factor: 12

Contribution: Directed research and guided manuscript preparation.

9. Khan, A.A.; **Fullerton-Shirey, S.K.**; Howard, S.S.* “Easily prepared ruthenium-complex nanomolecule probes for two-photon quantitative imaging of oxygen in aqueous media” *RSC Advances*, **2015**, 5, 291-300. Impact factor: 3.7

Contribution: Developed experimental procedure for probe encapsulation, provided input on data analysis, contributed to manuscript preparation.

8. Schaetzl, D.M.[†]; Li, P.; Chaudhari, N.; Bernstein, G.H.; **Fullerton-Shirey, S.K.*** “Magnetic alignment of gamma (core) - alpha (shell) Fe₂O₃ nanorods in a solid polymer electrolyte for Li-ion batteries” *J. Physical Chemistry C*, **2014**, 118, 18836-18845. 2012 Impact factor: 4.8

Contribution: Conceived of and directed project, designed experiments, aided first author (undergraduate student) with data analysis and manuscript preparation.

7. Elliott, L.C.C.; Jing, B.; Akgun, B.; Zhu, Y.; Bohn, P.W.; **Fullerton-Shirey, S.K.*** “Loading and distribution of a model small molecule drug in poly(N-isopropyl-acrylamide) brushes - a neutron reflectometry and AFM study” *Langmuir* **2013**, 29, 3259-3268. 2012 Impact Factor: 4.19

Contribution: Conceived of and directed project, designed experiments, collected and analyzed

neutron scattering data, co-wrote manuscript with Elliott.

6. Do, N.S.[†]; Schaetzl, D.M.[†]; Dey, B.; Seabaugh, A.C.; **Fullerton-Shirey, S.K.*** “Influence of Fe₂O₃ nanofiller shape on the conductivity and thermal properties of solid polymer electrolytes: \hat{E} nanorods versus nanospheres” *J. Phys. Chem. C* **2012**, 116, 21216-21223.

2012 Impact factor: 4.8

Contribution: Conceived of and directed project, designed experiments, aided first author (Notre Dame undergraduate) with data analysis and manuscript preparation.

Penn State

5. **Fullerton-Shirey, S.K.***; Ganapatibhotla, V.N.R.; Shi, W.; Maranas, J.K. “Influence of humidity and crystallization time on the ionic conductivity of nanoparticle-filled solid polymer electrolytes” *Journal of Polymer Science, Part B: Polymer Physics* **2011**, 49, 1496-1505. 2012 Impact factor: 2.21

4. **Fullerton-Shirey, S.K.**; Maranas, J.K.* “Structure and mobility of PEO/LiClO₄ solid polymer electrolytes filled with Al₂O₃ nanoparticles” *Journal of Physical Chemistry C* **2010**, 114, 9196-9206. 2012 Impact factor: 4.8

3. **Fullerton-Shirey, S.K.**; Maranas, J.K.* “Effect of LiClO₄ on the structure and mobility of PEO-based solid polymer electrolytes” *Macromolecules* **2009**, 42(6), 2142-2156. 2012 Impact factor: 5.5

2. **Fullerton, S.K.**; Maranas, J.K.* “A molecular dynamics study of the structural dependence of boron oxide nanoparticles on shape” *Nano Letters* **2005**, 5, 363-368. 2005 Impact factor: 9.9

1. **Fullerton, S.K.[†]**; Maranas, J.K.* “A molecular interpretation of vitreous boron oxide dynamics” *Journal of Chemical Physics* **2004**, 121, 8562-8570. 2005 Impact factor: 3.14

NON-PEER REVIEWED PUBLICATIONS

(i) INVITED PUBLICATIONS

2. Seabaugh, A.; Fathipour, S.; Li, W.; Lu, H.; Park, J.-H.; Kummel, A.C.; Jena, D.; **Fullerton-Shirey, S.K.**; Fay, P. “Steep subthreshold swing tunnel FETs: GaN/InN/GaN and transition metal dichalcogenide channels” 2015, International Electron Devices Meeting (IEDM), *Invited*.

1. **Fullerton-Shirey, S.K.**; Maranas, J.K. “Molecular mobility and ion transport in solid polymer electrolytes for lithium batteries”, *NIST Center for Neutron Research 2009 Annual Report* Special Publication 1105, 32-33.

(ii) PATENT

Fullerton-Shirey, S.K.; Seabaugh, A.C. “Single transistor random access memory using ion storage in two-dimensional crystals” *Patent* 9,899,480 *Issue Date:* February 20th, 2018.

(iii) ARTICLES HIGHLIGHTING FULLERTON’S RESEARCH PROGRAM

6. “Engineering alumna named an Alfred P. Sloan Research Fellow” Jamie Oberdick, *Penn State News*, **May 26th, 2020**. <https://news.psu.edu/story/621180/2020/05/26/academics/engineering-alumna-named-alfred-p-sloan-research-fellow>

5. “Alumni Spotlight” *Penn State Engineering Magazine* **Spring/Summer 2019**, pg 38. <http://online.flipbuilder.com/wool/xvww/mobile/index.html>

4. “Mason awardees display benefits of outsider perspectives” Elana Kimbrell, *Science* **2019** 363, 357
3. “Marion Milligan Mason Awards: V.E. Ferry, S.K. Fullerton, L.C. Hsiao, H.J. Kulik, C.S. Schindler” *Angewandte Chemie* **25 January 2019** <https://doi.org/10.1002/anie.201900118>
2. “Researchers Look For Ways To Make Juice Boxes, Chip Bags And Other Layered Packaging Recyclable” Joaquin Gonzalez, *National Public Radio (NPR) Pittsburgh* **6 March 2018**.
1. “Davos: the inventions cutting plastic consumption” *The British Broadcasting Corporation (BBC)* **23 January 2018**.

(iv) INVITED PRESENTATIONS

Summary: Presentations 1, 13-36 with Pitt affiliation

36. *Materials Research Society (MRS) Fall Meeting* “Molecularly Thin Electrolyte for All Solid-State Nonvolatile Two- Dimensional Crystal Memory” **Fullerton Shirey, S.K.** December 2nd, Boston MA USA.
35. *University of Notre Dame - Department of Electrical Engineering* “Beyond Batteries: Reimagining the role of ions in electronics” **Fullerton Shirey, S.K.** October 11th 2019, Notre Dame, IN USA.
34. *Keynote: Penn State Chemical Engineering Research Day* “The Power of the Outsider” **Fullerton Shirey, S.K.** September 20th 2019, University Park, PA USA.
33. *AAAS Marion Milligan Mason Award for Women in the Chemical Sciences Symposium and Reception, American Chemical Society (ACS) Fall meeting* “Beyond batteries: Reinventing the role of ions in electronics and smart materials” **Fullerton Shirey, S.K.** August 28th 2019, San Diego, CA USA.
32. *American Association for the Advancement of Science (AAAS) Awards Ceremony: Marion Milligan Mason Award for Women in the Chemical Sciences* “The Power of the Outsider” **Fullerton Shirey, S.K.** December 13th 2018, Washington, D.C. USA.
31. *Michigan State University - Department of Chemical Engineering* “Using ions to control transport in 2D materials” **Fullerton Shirey, S.K.** December 6th 2018, East Lansing, MI USA.
30. *US - EU Workshop on 2D Layered Materials and Devices*, San Sebastian, Spain; **Fullerton-Shirey, S.K.** September 13, 2018. Oral. Workshop by invitation only.
29. *Compound Semiconductor Week (CSW 2018)* “Electric Double Layer Dynamics in Graphene FETs: Using Ions to Control Transport in Two-Dimensional Materials” **Fullerton Shirey, S.K.**, Xu, K.; Islam, M.M.; Guzman, D.; Seabaugh, A.; Strachan, A. *Session: Novel Materials (2D Materials)* May 30th 2018, Boston, MA USA.
28. *University of Texas at Dallas - Department of Materials Science and Engineering* “Using ions to control transport in 2D materials” **Fullerton Shirey, S.K.** April 6th 2018, Dallas, TX USA.
27. *Case Western Reserve University - Condensed Matter Physics Seminar Series* “Using ions to control transport in 2D materials” **Fullerton Shirey, S.K.** April 2nd 2018, Cleveland, OH USA.
26. *Cornell University - Department of Materials Science and Engineering* “Using ions to control transport in 2D materials” **Fullerton Shirey, S.K.** March 15th 2018, Ithaca, NY USA.

25. *University of Michigan - Department of Chemical Engineering* “Using ions to control transport in 2D materials - a path to low-power electronics at the limit of scaling” **Fullerton Shirey, S.K.** September 19th 2017, Ann Arbor, MI, USA.
24. *Electrochemical Society (ECS) spring meeting* “Electrostatic Double Layer Flash Memory Based on Two-dimensional Crystals” **Fullerton Shirey, S.K.**, Xu, K.; Liang, J.; Lu, H.; Wang, W.; Kim, H.; Kwak, I.; Cho, K.; Kummel, A.C.; Seabaugh, A. *Session: Properties and applications of 2D layered materials*, May 29th 2017, New Orleans, LA, USA.
23. *TMS 2017 (The Minerals, Metals and Materials Society annual conference)* “Using Ions to Control Transport in Two-dimensional Materials for Electronics” Xu, K.; Liang, J.; Lu, H.; Kinder, E.; Kummel, A.; Seabaugh, A.; **Fullerton-Shirey, S.K.** February 27th, 2017, San Diego, CA, USA. *Note:* presentation delivered by postdoc Dr. Ke. Xu because I was 9 months pregnant
22. *The Pennsylvania State University - Department of Materials Science and Engineering; Polymer Physics Seminar Series* “Polymer electrolytes for exploring transport in two-dimensional materials for electronics” **Fullerton Shirey, S.K.** January 30th, 2017, University Park, PA, USA.
21. *University of California at Berkeley - Department of Electrical Engineering and Computer Science* “Using ions to control transport in two-dimensional materials for electronics” **Fullerton Shirey, S.K.** November 16th, 2016, Berkeley, CA, USA.
20. *Science 2016: Game Changers - University of Pittsburgh* “Using ions to control transport in two-dimensional materials for electronics” **Fullerton Shirey, S.K.** October 20th, 2016, Pittsburgh, PA, USA.
19. *Tec Talk, Micron Technology, Inc.* “Polymer/semiconductor electric double layers for memory and selectors” **Fullerton Shirey, S.K.** and Alan Seabaugh, September 30th, 2016, Boise, ID.
18. *CMOS Emerging Technologies Research* “Using ions to control transport in 2D materials for low-power transistors and memory” **Fullerton Shirey, S.K.**, May 27th, 2016, Montreal Canada.
17. *The Pennsylvania State University, 4th Annual Workshop on 2D materials - Graphene and Beyond: From Atoms to Applications* “Nanoionic two-dimensional memory” **Fullerton Shirey, S.K.** May 10th, 2016, University Park, PA, USA.
16. *Innovation in Materials, 2016, sponsored by PPG Industries* “Using ions to control transport in two-dimensional materials for electronics” **Fullerton Shirey, S.K.**, May 5, 2016, Pittsburgh, PA, USA.
15. *Materials Research Society (MRS) Spring Meeting* “2D Electrolytes for the Development of 2D Crystal Memory” **Fullerton Shirey, S.K.**, Xu, K.; Lu, H.; Wang, W.; Kim, H.; Kwak, I.; Cho, K.; Kummel, A.C.; Seabaugh, A. *Session: Novel Materials for End-of-Roadmap Devices in Logic, Power and Memory*, March 30th 2016, Phoenix, AZ, USA.
14. *University of Pittsburgh - Department of Electrical and Computer Engineering* “Field-controlled ion gating of two-dimensional crystals for logic and memory” **Fullerton Shirey, S.K.** November 4, 2015.
13. *Carnegie Mellon University - 2D Materials Center* “Ion gating of 2D materials for logic and memory” **Fullerton Shirey, S.K.** September 16, 2015.
12. *University of California Riverside - Department of Electrical and Computer Engineering* “Engineering ion-electron transport for low-power, two-dimensional electronics” **Fullerton Shirey, S.K.** May 11, 2015.

11. *US - EU Workshop on 2D Layered Materials and Devices*, Arlington, VA, USA “Nanometer-thick Ion Conductors for 2D Crystal Memory” **Fullerton-Shirey, S.K.**, Lu, H.; Wang, W.; Kim, H.; Kwak, I.; Furuyama, T.; Kobayashi, N.; Cho, K.; Kummel, A., Seabaugh, A.” April 22-24, 2015. Poster. Workshop by invitation only.
10. *West Virginia University - Department of Chemical Engineering* “Engineering ion-electron transport for low-power, two-dimensional electronics” **Fullerton Shirey, S.K.** March 11, 2015.
9. *University of Pittsburgh - Department of Chemical and Petroleum Engineering* “Engineering ion-electron transport for low-power, two-dimensional electronics” **Fullerton Shirey, S.K.** February 23, 2015.
8. *University of Minnesota - Materials Research Science and Engineering Center (MRSEC)* “Field-controlled ion gating for low power transistors and graphene memory” **Fullerton Shirey, S.K.** September 26, 2014.
7. *STARnet Accel eWorkshop* “Field-controlled ion doping of transition metal dichalcogenide FETs and two-dimensional ion-graphene memory” **Fullerton Shirey, S.K.** Available by WebEx to all STARnet researchers. May 7, 2014.
6. *Institute for Nanoelectronics, Technische Universitat Munchen (TUM)* “Influence of metal oxide nanofillers on the ionic conductivity of solid polymer electrolytes for rechargeable lithium-ion batteries” Do, S.; Schaetzl, D.; Dey, B.; Seabaugh, A.C.; **Fullerton Shirey, S.K.** December 2011. Munich, Germany.
5. *American Chemical Society (ACS) Central Regional Meeting* “Conductivity improvement in nanorod-filled solid polymer electrolytes for lithium-ion batteries” Dey, B.; Do, S.; Schaetzl, D.; Seabaugh, A.C.; **Fullerton Shirey, S.K.** *New Advances in Polymer Materials* June 2011. Indianapolis, IN, USA.
4. *American Conference on Neutron Scattering (ACNS)* “Polymer mobility of nanoparticle-filled Solid Polymer Electrolytes using Neutron Scattering” **Fullerton Shirey, S.K.**; Maranas, J.K. *Neutron Scattering for the Study of Soft Matter Tutorial*, June 2010. Ottawa, ON, Canada.
3. *2010 National Academies Panel on Neutron Research* “Structure and mobility of PEO-based Solid Polymer Electrolytes” **Fullerton Shirey, S.K.**; Maranas, J.K. *NIST Center for Neutron Research*, March 2010. Gaithersburg, MD, USA.
2. *NSF Review: Center for High Resolution Neutron Scattering* “Structure and mobility of PEO-based Solid Polymer Electrolytes” **Fullerton Shirey, S.K.**; Maranas, J.K. *NIST Center for Neutron Research*, October 2009. Gaithersburg, MD, USA.

Non-technical Invited Talks

5. *U. of Pittsburgh, Engineering Graduate Student Organization* “Navigating the work/life balance and using the imposter syndrome to help you excel in your career” **Fullerton Shirey, S.K.**, September 9th, 2020, Pittsburgh, PA.
4. *U. of Pittsburgh, Department of Neurology “Grant Rounds” Seminar Series* “Navigating the work/life balance and using the imposter syndrome to help you excel in your career” **Fullerton Shirey, S.K.**, February 5th, 2020, Pittsburgh, PA.
3. *Penn State Women in Materials Science Lecture Series* “Curiosity about materials is the driving force behind my career - starting with bubble gum” **Fullerton Shirey, S.K.**, April 8th, 2019, University Park, PA.

2. *Theta Tau 2019 Midwest Conference* “Using the imposter syndrome to help you excel in your career” **Fullerton Shirey, S.K.**, March 30th, 2019, University of Pittsburgh.

1. *The Pittsburgh Quantum Institute (PQI): Women in Quantum Science and Engineering Lecture Series* “Navigating the work/life balance and using the imposter syndrome to help you excel in your career” **Fullerton Shirey, S.K.**, February 7th, 2017, University of Pittsburgh.

Note: Conference presentations with Fullerton as presenting author, directing author, and co-author are found below in section L.

D. RESEARCH FUNDING

PEER-REVIEWED EXTERNAL RESEARCH FUNDING

Ongoing Research Support

- Title:** *Center for Nano Science (Penn State MRSEC)*
Investigators Vin Crespi (PI) + co-PIs including **Fullerton**
Source: NSF DMR MRSEC
Amount: \$20M over 6 years (Fullerton lab: \$557,000)
Duration 2020 - 2026
Summary: IRG1 - 2D Polar Metal Heterostructures. Use electric double layer (EDL) gating of two-dimensional (2D) metals to uncover new optical and electrical properties;
- Title:** *DURIP: Acquisition of a Broadband Dielectric Spectrometer for Characterizing Dynamics in Ionic Soft Materials*
Investigators Jennifer Laaser, **Susan Fullerton**, Geoff Hutchinson, Sean Garrett-Roe, Tara Meyer
Source Air Force (AFOSR)
Amount: \$313,000
Duration Spring 2021
Summary: Funds to purchase a Broadband Dielectric Spectrometer (BDS).
- Title:** *CAREER: Scaling Electrolytes to a Single Monolayer for Low-Power Ion-Gated Electronics with Unconventional Characteristics*
Investigator: **Susan Fullerton (PI)**
Amount: \$540,000 over 5 years
Source: NSF-DMR-EPM
Duration: June 2019 - May 2024
Summary: Development of a single monolayer ion conductor for application in flash memory.
- Title:** *Reinventing the role of ions in electronics*
Investigators **Susan Fullerton**
Source 2020 Alfred P. Sloan Research Fellowships in Chemistry
Amount: \$75,000 over 2 years
Duration Fall 2020 - Fall 2022
- Title:** *A New Approach to Explore the Semiconductor-to-Metal Phase Transition in Two-Dimensional Crystals Using Ionomers*
Investigators: **Susan Fullerton (PI)**, Eric Beckman (co-PI)
Amount: \$496,272
Source: NSF-DMR-EPM
Duration: July 2016 - June 2021
Summary: Demonstrate steep, sub-threshold switching by using a single-ion conductor to induce the semiconductor to metal transition in single-layer MoTe₂.

Completed Research Support

- 6. Title:** *Recyclable, flexible and durable packaging created through nano-engineering*
Investigators: Eric Beckman (PI), **Susan Fullerton (co-PI)**, Sachin Velankar (co-PI)
Amount: \$200,000 over 1 year
Source: The Ellen MacArthur Foundation and Nine Sigma
Duration: March 2018 - March 2019
Summary: International award - one of 5 winners. Use nano-engineering to create a recyclable material that can replace complex multi-layered packaging.
Fullerton's role: Develop oxygen barriers and establish structure-property relationships
- 7. Title:** *Beyond batteries: Reinventing the role of ions in electronics and smart materials*
Investigator: **Susan Fullerton (PI)**
Amount: \$50,000 over 2 years
Source: AAAS Marion Milligan Mason Award
Duration: January 2019 - December 2020
Summary: Chemistry of monolayer electrolyte.
- 8. Title:** *Holographic Assembly of Reconfigurable Nanoscale Plasmonic and Photonic Elements*
Investigators: Paul Bohn (PI), David Go (co-PI), Greg Timp (co-PI), Ryan Roeder (co-PI), **Susan Fullerton (co-PI)**, Anthony Hoffman (co-PI)
Amount: \$900,000 (Fullerton lab: \$150,000)
Source: DARPA Atoms to Products (A2P)
Duration: May 2015 - April 2018
Summary: Demonstrate a metamaterial with reconfigurable optical properties
Fullerton's role: Development of polymer electrolyte and detailed study of filament formation and dissolution kinetics
- 9. Title:** *GOALI: A low-voltage nonvolatile single transistor flash memory device based on ion transport in 2D electrolytes*
Investigators: **Susan Fullerton (PI)**, Alan Seabaugh (co-PI)
Amount: \$368,388 over 3 years
Source: NSF-ECCS
Duration: July 2014 - June 2017
Summary: Demonstrate a flash memory based on two-dimensional (2D) materials
Fullerton's role: Invention and development of monolayer electrolyte and device fabrication and electrical measurement
- 10. Title:** *Center for Low Energy Systems Technology (LEAST)*
Investigators: Alan Seabaugh (PI), **Susan Fullerton (co-PI)** + 27 co-PIs
Amount: \$29,860,355 (Fullerton lab: \$1,150,059)
Source: SRC-DARPA Focus Center Research Program (FCRP)
Duration: January 2013 - October 2017
Summary: A microelectronics center focused on the development of low-energy devices for logic and memory
Fullerton's role: Develop ion gating strategies to demonstrate steep subthreshold swing in beyond CMOS transistors, and steep switching for next-generation memory.
- 11. Title:** *Neutron scattering at ORNL to characterize the structure of poly(trimethylene glycol)/water*
Investigators: **Susan Fullerton**

Amount: \$10,000 **Source:** ORAU Ralph E. Powe Junior Faculty Enhancement Award
Duration: June 2016 - May 2017

12. **Title:** *Development of Materials for Improved Secondary Battery Technology*
Investigators Paul McGinn (PI), Joan Brennecke (co-PI), **Susan Fullerton (co-PI)**, Prashant Kamat (co-PI), Ed Maginn (co-PI), Alan Seabaugh (co-PI)
Source Department of Defense, U.S. Army, TARDEC
Amount: \$1,386,000 over 3 years (Fullerton lab: \$160,000)
Duration August 2010 - November 2013
Summary:Development of new materials and models for battery technology
Fullerton's role: Experimental design, electrolyte/nanoparticle preparation, and electrical measurements to study how nanoparticle aspect ratio affects ionic conductivity of polymer electrolytes

OTHER RESEARCH FUNDING

Completed Research Support

13. **Title:** *Tuning polymer architecture to enable tamper resistant electronics*
Investigators: Susan Fullerton and Jenny Laaser (Chemistry)
Amount: \$20,000 (Fullerton lab: \$10,000)
Source: U. of Pittsburgh Chemistry/SSOE
Duration: March 2018 - March 2019
Summary: To create transient electronics for which the lifetime of the device can be tuned by tuning the molecular properties of the polymers.
Fullerton's role: Device design, fabrication and electrical measurements using the polymer electrolytes synthesized by Laaser.
14. **Title:** *New Polymer Electrolyte by Hyperbranched Polymer Assembly for Rechargeable Lithium-Ion Batteries*
Investigators: Y. Elaine Zhu (PI), **Susan Fullerton (co-PI)**, Haifeng Gao (co-PI)
Amount: \$99,808 (Fullerton lab: \$25,000)
Source: U. Notre Dame Sustainable Energy Initiative
Duration: April 2014 - April 2015
Summary: A new polymer architecture for potential use as a battery electrolyte
Fullerton's role: Experimental design, electrolyte preparation, and electrical measurements of new polymers synthesized by co-PI Gao

E. CONTRIBUTIONS TO TEACHING

1. Courses Taught at the University of Pittsburgh

Transport Phenomena (required undergraduate course) ChE 300 - Fall 2016, 2017, 2018, 2019
Credits: 6 (Eight contact hours/week)
Description: combines all three modes of transport - momentum, mass and heat - in one course.
OMET score, term (number of students):
4.67/5, Fall 2016 (70); 4.63/5, Fall 2017 (64); 4.67/5, Fall 2018 (60); 4.53/5, Fall 2019 (66)

2. Classroom innovations introduced at the University of Pittsburgh

Active learning

- Established Pitt as a site for NSF-funded Desktop Learning Modules for fluid dynamics and heat transfer; PI: Bernard Van Wie; Washington State University; Deployed the hands-on modules during Fall 2020 (both virtually and in-person) to Graduate Transport (ChE 2301) and both sections of Undergrad Transport (ChE 300).

- First in the department to introduce Top Hat (electronic response tool)
- Prepared in-class and video recorded demonstrations to convey concepts

Group work, Evaluation and Assessment, Societal Impacts

- Group heat exchanger project; used CATME to assign groups and acquire peer feedback
- Weekly formative assessment: used Top Hat to collect student feedback on “muddy” and “clear” concepts; addressed “muddy” concepts in the next lecture.
- Evaluated ecological impacts of cooling water discharge into rivers

3. Contributions to non-classroom teaching

Undergraduate Research

University of Pittsburgh: 13 undergrads

First-authored Publication:

Aaron Woepfel; *ACS Applied Materials & Interfaces* 2020; Paper 50

Co-authored Publications:

Abigale Gray; *Advanced Functional Materials* 2019, Paper 41

Blaec Toncini; *Advanced Materials Interfaces* 2018; Paper 33

Award: Matei Jordache - 1st place in the OXE Undergraduate research poster competition; Pitt ChE research day; 2/20/18

University of Notre Dame: 10 undergrads and 2 high school students

First-authored Publication:

Suong Do; *Journal of Physical Chemistry C.*, 2012; Paper 6

Dean Schaetzl; *Journal of Physical Chemistry C.*, 2014; Paper 8

F. PERSONNEL SUPERVISED

Visiting Research Professors

1. Ke Xu, Ph.D.

August 2014 - present

University of Pittsburgh, ChE

Project: “Ion gating for low voltage electronic devices.”

Support: SRC/DARPA (LEAST); NSF-DMR-EPM

2. Huilong Xu, Ph.D.

August 2013 - August 2014

University of Notre Dame, EE

Project: “Electrostatic doping of 2D materials for memory and TFETs”

Support: SRC/DARPA (LEAST)

Postdoctoral Scholars

1. Huamin Li, Ph.D (co-Advised with Alan Seabaugh, EE)

May 2014 - March 2015

University of Notre Dame, EE

Project: “Electric double layer dynamics studied on graphene FETs”

Support: SRC/DARPA (LEAST)

2. Benxin Jing, Ph.D (co-advised with Elaine Zhu, ChE)

April 2014 - April 2015

University of Notre Dame, ChE

Project: “New Polymer Electrolyte by Hyperbranched Polymer Assembly for Rechargeable Li-ion batteries.”

Support: Notre Dame internal grant

PhD Students

Summary: Completed PhDs: 3 as sole advisor, 1 as co-advisor.

In progress at Pitt: 3 as sole advisor

1. Erich Kinder

January 2013 - June 2017

PhD Student, University of Notre Dame, EE

Dissertation: “Gating of two-dimensional materials using solid polymer electrolytes and ferroelectrics”

Defense date: 6/23/2017

Support: SRC/DARPA (LEAST)

Awards:

1. 3rd place prize of \$225 at the IEEE mini-symposium on Electron Devices and Photonics, Notre Dame, IN. January 2015
 2. \$3,000 NSF Travel Award to the 11th International Nanotechnology Conference on Communication and Cooperation, Hilton Sea Hawk, Fukuoka-city, Fukuoka, Japan *May 11-13, 2015*.
- Current employer: Texas Instruments

2. Hao Lu (F) (co-advised with Alan Seabaugh, EE)

July 2014 - October 2016

PhD Student, University of Notre Dame, EE

Dissertation: “Development of Nanometer Ion Conductor for 2D-Crystal Memory and Universal Tunnel Transistor SPICE Model.”

Defense date: 10/3/2016

Support: SRC/DARPA (LEAST), NSF-ECCS/GOALI

Current employer: Facebook

3. Jierui (Jerry) Liang

October 2015 - November 2020

PhD Student, University of Pittsburgh, ChE

Dissertation: “Ion-Controlled Electronics Enabled by Electric Double Layer Gating of Two-Dimensional Materials”

Defense date: 10/29/2020

Support: NSF, PQI Award

Awards:

1. Pittsburgh Quantum Institute’s Science 2019 “veteran” poster session award
2. Pittsburgh Quantum Institute’s Graduate Student Award (support for Fall 2019)
3. Pittsburgh Quantum Institute’s Science 2016 and 2017 poster session grand prize

Note: Jerry won the grand prize of a \$1,000 travel award and an iPad two consecutive years

4. Zhongmou Chao

October 2015 - November 2020

PhD Student, University of Pittsburgh, ChE

Dissertation: “Silver Filament Formation and Dissolution Dynamics Through a Polymer - Ionic Liquid Composite by Direct Write”

Defense date: 10/28/2020

Support: DARPA Atoms to Products and the PPG Foundation; Start-up

Awards:

1. PPG Graduate Research Fellowship for “Polymer coatings with reconfigurable optical properties.” (\$20k), 2018
2. Best paper award; Dept. of Chemical and Petroleum Engineering (\$500) 2018
3. PQI Travel award for best poster presentation at 2019 annual conference (\$1,000) 2019

5. Shubham Awate

November 2018 - present

PhD Student, University of Pittsburgh, ChE

Expected graduation: 2023

Project: “Nanoionic 2D crystal memory”

Support: NSF, AAAS

Awards:

1. Pittsburgh Quantum Institute’s “Science 2019” Travel Award (\$1,000)

2. Pittsburgh Quantum Institute's 2020 Veteran Poster Award

6. Huiran (Henry) Wang

December 2019 - present

PhD Student, University of Pittsburgh, ChE

Expected graduation: 2024

Project: "Monolayer electrolyte for 2D crystal memory"

Support: NSF-DMR-EPM CAREER

Awards:

1. Poster Award (1 of 3 winners): EL04 Graphene and Beyond Symposium; Materials Research Society (MRS) Fall 2020 Virtual Meeting (\$200)
2. Pittsburgh Quantum Institute's 2020 Poster Presentation Award (virtual) (\$500)

7. Nader Majet Sawtarie

December 2020 - present

PhD Student, University of Pittsburgh, ChE

Expected graduation: 2025

Project: "Modulating optical and electronic properties of 2D metals using EDL gating"

Support: NSF-DMR MRSEC

MS Students

1. Sandhya Vasudevan (F)

June 2014 - May 2016

MS Student, University of Notre Dame, EE

MS Thesis: "The effect of nanoparticle shape on conductivity in solid polymer electrolytes."

Defense date: 5/19/2016

Support: N/A

Current employer: Completed PhD in EE at Notre Dame 2020

2. Ziwei Guo

November 2015 - April 2017

MS Student, University of Pittsburgh, ChE

MS Thesis: "Electrolyte Gating of TIPS-Pentacene and Graphene Field Effect Transistors"

Defense Date: 4/31/2017

Support: N/A

Current employer: Cloud Clean Biological Technology Co. Ltd.

3. Micah (Eli) Bostian (co-advised with Prof. James McKone)

January 2018 - July 2020

MS Student, University of Pittsburgh, ChE

MS Thesis: "Exploring Electrochemical Reactivity in Ionically-Gated Field-Effect Transistors"

Defense Date: 7/15/2020

Support: NSF-DMR-EPM

Current employer:

Undergraduate Researchers

1. Brendan Mostek

Spring 2020 - present

University of Pittsburgh, ChE

Project: "Coupling ion-electron transport in ion-gated field-effect transistors using COMSOL Multiphysics"

Support: N/A

2. Jonathan Bingaman

January 2020 - December 2020

University of Pittsburgh, ChE

Project: "Recycling the Unrecyclable"

Support: N/A

- 3. Samantha Bunke (F)** *Spring 2019 - Summer 2019*
 University of Pittsburgh, ChE
 Project: “A new approach to recyclable materials ”
 Support: SSOE Undergraduate Research Award (Summer 2019)
- 4. Abigale Gray (F)** *Spring 2019*
 University of Pittsburgh, ChE
 Project: “Nano-scale filament formation/dissolution dynamics in solid electrolytes ”
 Support: N/A
- 5. Noah Sakmar** *Spring 2019*
 University of Pittsburgh, ChE
 Project: “New materials for recycling”
 Support: N/A
- 6. Logan Kutzer** *Fall 2018*
 University of Pittsburgh, ChE
 Project: “A new approach to recyclable materials ”
 Support: N/A
- 7. Alvin Fersner (URM)** *Summer 2018*
 University of South Carolina
 Project: “Silica deposition by PECVD and sputtering on hygroscopic polymers”
 Support: NSF REU site; U. of Pittsburgh, Chem. Eng.
- 8. Jeirus Jose** *Summer 2018*
 San Francisco State University
 Project: “Electrical properties of doubly-polymerized ionic liquids”
 Support: NSF REU site; U. of Pittsburgh, Chem. Eng.
- 9. Aaron Woepfel** *September 2017 - present*
 University of Pittsburgh, ChE
 Project: “Modeling the field-strain relationship in ionomers”
 Support: SSOE Undergraduate Research Award (Summer 2018)
- 10. Brian Radka** *January 2017 - December 2017*
 University of Pittsburgh, ChE
 Project: “Filament formation/dissolution kinetics in a polymer/ionic liquid film ”
 Support: Start-up
- 11. Matei Jordache** *January 2017 - December 2017*
 University of Pittsburgh, ChE
 Project: “AFM Characterization of exfoliated MoS₂ and monolayer electrolyte”
 Support: NSF-DMR-ECCS REU supplement
- 12. Celina Celmo (F)** *Summer 2017*
 University of Pittsburgh, ChE
 Project: “Observing polymer crystallization with an ipone”
 Support: N/A
- 13. Blaec Toncini** *January 2016 - August 2016*
 University of Pittsburgh, ChE

Project: “Development of Processes for Cleaning Resist from 2D Crystal Surfaces”
Support: NSF-ECCS/GOALI REU (summer 2016)

14. Rachel Buck (F) *May 2016- August 2016*

University of Minnesota Duluth, ChE

Project: “Physical Characterization of Electrolytes for Reconfigurable Nanoscale Elements”

Support: NSF REU site; U. of Pittsburgh, Chem. Eng. (summer 2016)

15. Edward Hunckler *May 2015 - August 2015*

University of Notre Dame, EE

Project: “CO₂ cleaning of 2D crystal surfaces”

Support: NSF REU supplement (GOALI)

16. Ashley Fuller (F) *May 2015 - August 2015*

University of Notre Dame, Chem/ChE

“PVA-based electrolytes for ionic gating”

Support: NDnano

17. Katie O’Neill (F) *May 2014 - August 2014*

Trinity College, Dublin, Ireland

Project: “Characterizing 2D electrolytes for ion-graphene memory.”

Support: NDnano

18. Buchanan Bourdon *May 2013 - December 2014*

University of Notre Dame, EE

Project: “Modeling ion-electron transport in 2D materials”

Support: NDnano

19. Samuel Leung (co-advised with Alan Seabaugh, EE) *May 2012 - August 2012*

University of Notre Dame, ChE

Project: “Ion Transport in a Solid Polymer Electrolyte Between 2-D Graphene Surfaces

Support: NDnano

20. Josh Vahala (co-advised with Alan Seabaugh, EE) *May 2012 - December 2013*

University of Notre Dame, EE

Project: “Electrical characterization of ion transport in planar graphene/PEO:LiClO₄/graphene structures”

Support: NDnano

21. Nhu Suong Do (F) *Spring 2011 - Spring 2013*

University of Notre Dame & Saint Mary’s College, EE & Math

Project: “Effect of nano-filler shape on the conductivity of solid polymer electrolytes (SPEs) for rechargeable lithium-ion batteries”

Support: NDnano

22. Dean Schaetzel *Spring 2011 - Summer 2013*

Purdue University South Bend, EET

Project: “Aligning conductive pathways in solid polymer electrolytes for lithium-ion batteries”

Support: NDnano

23. Sarah Schubert (F) *May 2010 - August 2010*

University of Notre Dame, Chemistry

Project: "Preparing a solid-state quantum-dot sensitized rainbow solar cell with polymer nanoparticles"

Support: NDnano

High School Students

1. Kiersten Lieurance (F)

September 2013 - January 2014

Marian High School, Mishawaka

Project: "Electrical Characterization of PEO:LiClO₄ as a Function of Humidity"

Support: NDnano

2. Melissa Cunningham (F)

Fall 2011 - Spring 2011

Marian High School, Mishawaka

Project: "New materials for flexible batteries"

3rd Place in EE category at the 2011 Northern Indiana Regional Science and Engineering Fair

Support: NDnano

G. HONORS AND AWARDS

Sloan Research Fellowship in Chemistry, The Alfred P. Sloan Foundation (\$75,000)	2020
The Marion Milligan Mason Award for Women in the Chemical Sciences, American Association for the Advancement of Science (AAAS) (\$50,000)	2019
NSF CAREER Award (DMR-EPM) (\$540,000)	2018
James Pommersheim Award for Excellence in Teaching, Department of Chemical and Petroleum Engineering, University of Pittsburgh	2018
The Ralph E. Powe Junior Faculty Enhancement award, ORAU (\$10,000)	2016
The Frank J. Padden Jr. Award for " <i>Excellence in Polymer Physics Research</i> " The American Physical Society	2009
General Electric - First Year Faculty for the Future Fellowship in Engineering (\$10,000)	2007
Outstanding Research Presentation: The Larry Duda Award for Outstanding Graduate Student Performance in Chemical Engineering, sponsored by Arkema, Inc. (\$3000)	2006
Outstanding Teaching Assistant Award: The Walter R. and Aura Lee Supina Graduate Fellowship in Chemical Engineering (\$2000)	2004
National Science Foundation Graduate Research Fellowship	2004-2007
The Arthur and Elizabeth Rose Memorial Graduate Fellowship in Chemical Engineering (\$5000)	2003
Marie Underhill Noll Graduate Fellowship in Engineering (\$2500)	2003
General Electric - Faculty for the Future Fellowship in Engineering (\$5000)	2003
Paul Morrow Endowed Scholarship in Engineering (\$4000)	1998
James H. Lum Scholarship in Engineering (\$4000)	1998
Travel Award to the Eighth International Conference on Quasi-Elastic Neutron Scattering Bloomington Convention Center, Bloomington, IN USA	<i>June 14-17, 2006</i>

Travel Award to the Spallation Neutron Source - High Flux Isotope Reactor Users Meeting
Oak Ridge National Laboratory, Oak Ridge, TN USA *October 11-13, 2005*

Travel Award to Methods and Applications of Neutron Spectroscopy
NIST Center for Neutron Research, Gaithersburg, MD USA *June 20-24, 2005*

H. PROFESSIONAL SERVICE AND LEADERSHIP ACTIVITIES

University Service

- Quantum Theory Advisory Committee (Invited, 2021 - present);
Chair - Senior Vice Chancellor for Research, Rob Rutenbar
- 2021 Search Committee for Quantum Theory Faculty Position; Chair Prof. Jeremy Levy
- 2018 University of Pittsburgh Provost Search Committee
 - elected by faculty members of the Professional schools
 - position filled by Prof. Ann Cudd
- Panel member at 2018 Women in STEM conference (University of Pittsburgh)
- Goldwater Undergraduate Scholarship selection committee, Fall 2015

SSOE Service

- 2017 Swanson School of Engineering Dean's Search Committee
 - elected by the SSOE Assistant Professors
 - position filled by Prof. James Martin II
- Faculty Advisor to the Nanotechnology Student Club 2017 - 2019
- Guest Lecturer for Engineering 3000 (for Prof. April Dukes)

Department Service

- Vice Chair for Graduate Education May 2020 - present
- Graduate admissions committee Chemical Engineering 2015 - 2019
- TS Faculty search committee Chemical Engineering
 - 2017/2018 position filled by Prof. Tagbo Niepa
 - 2018/2019, filled the position, but applicant withdrew after accepting the offer
- Co-coordinator of Chemical and Petroleum Engineering seminar series 2016-2019
organize networking lunches between women seminar speakers and graduate students (ongoing)

Thesis Committees

- University of Pittsburgh
 - Victor Manrique: ChE (Li), MS completed 2016 (committee member)
 - Amey More: ChE (Veser), PhD completed 2016 (committee member)
 - Jiaqi Zhao: ChE (Li), PhD completed 2018 (committee member)
 - Aayush Mantri: ChE (McKone), MS completed April 2018 (committee member)
 - Quing Guo: Physics (Levy), PhD completed May 2020 (committee member)
 - Jierui (Jerry) Liang: ChE (Fullerton), PhD completed 2020 (advisor)
 - Zhongmou Chao: ChE (Fullerton), PhD completed 2020 (advisor)
 - Daniel Burrill: Chemistry (Lambrecht), PhD completed April 2020 (committee member)
 - Jenna Gustafson: ChE (Wilmer), PhD completed 2019 (committee member)
 - Micah (Eli) Bostian: ChE, (Fullerton/McKone) MS completed 2020 (co-advisor)
 - Pinlei Lu: Physics (Hatridge), PhD expected 2023 (committee member)
 - Carli Judith Kelsheimer: Chemistry (Garrett-Roe), PhD expected 2020 (committee member)
 - Shubham Awate: ChE (Fullerton), PhD expected 2023 (advisor)
 - Qiudi Meng: ChE (McKone), MS completed 2019 (committee member)
 - Daniel Bolt: Chem (Dennis Curran), PhD completed 2019 (committee member)
 - Tejal Sawant: ChE (McKone), PhD completed 2020 (committee member)
 - Kutay Sezginel: ChE (Wilmer), PhD completed December 2019 (committee member)

- Bingchen Wang: ChE (Li), PhD expected Spring 2021 (committee member)
- Erin Sutton: Physics (Levy), PhD expected 2022 (committee member)
- Evan Richards: ChE (Federspiel), PhD expected 2023 (committee member)
- Emily Ackerman: ChE (Shoemaker), PhD expected 2021 (committee member)
- Huiran (Henry) Wang: ChE (Fullerton), PhD expected 2024 (advisor)
- Nader Sawtarie: ChE (Fullerton), PhD expected 2025 (advisor)
- University of Notre Dame
 - Hao Lu (Fullerton), EE, PhD completed 2016 (co-advisor)
 - Eric Kinder, EE (Fullerton), PhD completed 2017 (advisor)
 - Sandhya Vasudevan (Fullerton), EE, MS completed 2017 (advisor)
 - Sara Fathipour: EE (Seabaugh), PhD completed 2017 (committee member)
 - Garrison Crouch(Seabaugh): ChE, PhD completed 2019 (committee member)
 - Mina Asghari Heidarlou (Seabaugh): EE, PhD completed 2019(committee member)
 - Paolo Paletti (Seabaugh): EE, PhD completed 2019 (committee member)
 - Karla Gonzalez (Seabaugh): EE, PhD expected 2020 (committee member)
- Carnegie Mellon University
 - Dacen Waters, Physics, PhD expected August 2020 (committee member)
- Penn State University
 - Shruti Subramanian (Robinson), MATSE, PhD completed April 2020 (committee member)

University Institute Service

- Pittsburgh Quantum Institute (PQI) Executive Committee Member, Summer 2017 - present
- Poster judge for PQI 2016, 2018, 2019, 2020

Positions of Leadership

- General Arrangements Chair
 - 2018 Annual meeting of the the American Institute of Chemical Engineers (AIChE), Pittsburgh, PA
- Lead Symposium Organizer
 - Fall 2020 Materials Research Society (MRS) Meeting, Virtual
Symposium: “Beyond Graphene 2D Materials— Synthesis, Properties, and Device Applications” Co-organizers: Zak Al Balushi, Tania Roy, Jieun Lee
Workshop: organized and led (virtually) a workshop on “2D Layered Materials for Quantum”; Speakers Jeanie Lau (Ohio State), Nitin Samarth (Penn State), Nai-Chang Yeh (Caltech)

K-12 Outreach

- Materials Science Summer Camp, St. Joseph High School (Summer 2017);
 Demonstration of polymer crystallization using iphone
- New Brighton Elementary school (Fall 2017);
 Demonstration of polymer crystallization using iphone
- Materials Science and Technology Conference (Fall 2017);
 Poster presentations and demonstration of polymer crystallization using iphone
- Buffalo Elementary School, Sarver PA (Spring 2019);
 Active learning about solid/liquids/gases and polymers; Mrs Ortlip - Kindergarten
- PQI High School outreach (Spring 2019); Served as a panelist and gave a tour of my lab.
- Buffalo Elementary School, Sarver PA (Spring 2020);
 Active learning about solid/liquids/gases; Mrs. Miller - Grade 1

Federal Review Panels and Invited Meeting Participant

- NSF Panel Review (March 2015, March 2016, March 2019 (remote), March 2019)
- NSF-Sponsored US-EU Workshop on 2D Materials and Devices (by invitation only)
 (April 2015; October 2017; September 2018; May 2019)

Editorial Board

- *July 2019 - present: npj 2D Materials and Applications (Nature Partner Journal)*

Elected Conference Committee Member

- *2020 - 2023: Electronic Materials Conference, 3 year term*

Invited Organizer

- *2015 - 2020: Electronic Materials Conference*
Topics: (1) Materials for Memory and Computation, (2) Graphene BN, MoS₂ and other 2D Materials and Devices

Session Chair

- 2015 Electronic Materials Conference, Session K: Materials for Memory and Computation, Ohio State University, Columbus, OH, June 24, 2015
- 2016 Electronic Materials Conference, Session AA: Impact of Surface Interactions on 2D Devices, University of Delaware, Newark, DE, June 23, 2016
- 2017 Electronic Materials Conference, Session S: BN, BP, TMD and Novel 2D Materials, University of Notre Dame, Notre Dame, IN, June 29, 2017
- 2018 Electronic Materials Conference, Session OO: Emerging 2D Materials and Phenomena, University of California at Santa Barbara, Santa Barbara, CA, June 29, 2018
- 2019 Electronic Materials Conference, SESSION C: 2D Growth and Characterization, University of Michigan, Ann Arbor, MI, June 26, 2019
- 2019 Materials Research Society (MRS) Meeting, Session FF01.05: Advances in 2D Memory and Transistor Architecture Boston, MA, December 2, 2019

Journal and Proposal Reviewer

2D Materials, ACS Applied Materials and Interfaces, ACS Applied Polymer Materials, ACS Nano, Advanced Electronics, Advanced Functional Materials, Applied Physics Letters, Applied Physics Reviews, Beamtime Proposals at the NIST Center for Neutron Research (NCNR), Chemistry of Materials, Chem. Electro. Chem., Department of Energy Proposal, IEEE Transactions on Electron Devices, Ionics, Journal of Materials Chemistry A Journal of Vacuum Science and Technology Langmuir, Materials Communications Materials Science and Engineering B, Materials Science in Semiconductor Processing, Membranes, Nature, Nano Research, Nano Letters, Nanoscale, Nature Communications, PLOS One, Soft Matter, Scientific Reports, Science Advances, The Journal of Physical Chemistry, The Journal of Physical Chemistry Letters, The Journal of Polymer Science B.

I. CONTRIBUTIONS TO DIVERSITY

- Approximately of the students who have *completed research projects* in my lab are women (9/20)
PhD: Hao Lu, MS: Sandhya Vasudevan, Undergrads: Sammantha Bunke, Abigail Gray, Rachel Buck, Ashley Fuller, Katie O'Neill, Nhu Suong Do, Sarah Schubert, Kiersten Lieurance, Melissa Cunningham (High School Students)
- Non-technical, invited presentation on "The Imposter Syndrome and Work/Life Balance" in celebration of Pitt's "Year of Diversity" has been viewed on YouTube more than 580 times and presented live to approximately 250+ students via ChE Undergraduate Seminar Series 2017, 2019, SWE 2017 conference, SSOE GWEN Luncheon, Department of Neurology, Penn State, etc.
- Served on one Faculty search committee, one Dean's search committee, and one Provost's search committee (see details in section H) with women and URM candidates hired in each case (Provost Anne Cudd, Dean James Martin, Prof. Tabgo Niepa.)

J. PROFESSIONAL DEVELOPMENT

-*Writing Winning Grant Proposals: a two-day workshop by Dr. John Robertson of the Grant Writers' Seminars and Workshops LLC.* Organized by the Center for Faculty Excellence, Swanson School of Engineering; April 8th - 9th, 2015.

-*How to Engineer Engineering Education? A two-day workshop by Prof. Michael Prince, Bucknell University.* Organized by the Swanson School of Engineering; July 13th - 14th, 2016; June 8th, 2018.

-*Leadership development, networking, singletasking: a two-day workshop by Devora Zack, MBA, of Only Connect Consulting, Inc.;* Organized by the Center for Faculty Excellence, Swanson School of engineering; May 15th - 16th, 2017.

-*Alan Alda Science Communication Workshop;* Organized by the Swanson School of Engineering; June 12th - 13th, 2017.

-*Leading and managing your group: a two-day workshop by Devora Zack, MBA, of Only Connect Consulting, Inc.;* Organized by the Center for Faculty Excellence, Swanson School of engineering; July 25th - 26th, 2019.

K. PROFESSIONAL AFFILIATIONS

American Chemical Society [ACS]

American Institute of Chemical Engineers [AIChE]

American Physical Society [APS]

Electrochemical Society [ECS]

Institute of Electrical and Electronics Engineers [IEEE]

Materials Research Society [MRS]

Neutron Scattering Society of America [NSSA]

L. CONFERENCE PRESENTATIONS

(i) FULLERTON AS PRESENTING AUTHOR

23. Liang, J.; Xu, K.; Wu, M.; Wang, W.; Cho, K., **Fullerton-Shirey, S.K.** "Molecularly Thin All-Solid-State Non-Volatile Memory Gated By a Monolayer Electrolyte" *2019 AIChE Annual Meeting* November 2019, Orlando, FL USA.

22. Liang, J.; Xu, K.; Wu, M.; Wang, W.; Cho, K., **Fullerton-Shirey, S.K.** "Molecularly Thin All-Solid-State Non-Volatile Memory Gated by a Monolayer Electrolyte" *61st Electronic Materials Conference (EMC)* June 27th 2019, Ann Arbor, MI, USA.

21. **Fullerton-Shirey, S.K.**, Xu, K.; Woepfel, A.; Bostian, M.; McKone, J.; Ding, H.; Beckman, E.; Xu, K.; "A New Approach to Accessing the Semiconductor-to-Metal Transition in Two-Dimensional Crystals Using Ionomers" *2019 MRS spring meeting* April 2019, Phoenix, AZ, USA.

20. **Fullerton-Shirey, S.K.**, Xu, K.; Guzman, D.; Islam, M.; Strachan, A.; Seabaugh, A "Pulse dynamics of electric double layers on graphene FETs" *2018 AIChE Annual Meeting* October 2018, Pittsburgh, PA, USA.

19. **Fullerton-Shirey, S.K.**, Woepfel, A.; Bostian, M.; McKone, J.; Ding, H.; Beckman, E.; Xu, K.; "A New Approach to Accessing the Semiconductor-to-Metal Transition in Two-Dimensional Crystals Using Ionomers" *60th Electronic Materials Conference* June 2018, Santa Barbara, CA, USA.

18. **Fullerton Shirey, S.K.**; Li, H.-M.; Xu, K.; Bourdon, B.; Lu, H.; Lin, Y.-C.; Guzman, D.; Islam, M.; Strahan, A.; Robinson, J.; Seabaugh, A. "Dynamics of Electric Double Layer Formation and Dissipation in Polyethylene Oxide:LiClO₄ on Graphene Transistors" *2017 AIChE Annual meeting*, November 2nd 2017, Minneapolis, MN, USA.

17. **Fullerton Shirey, S.K.**, Xu, K.; Lu, H.; Wang, W.; Kim, H.; Kwak, I.; Cho, K.; Kummel, A.C.; Seabaugh, A. “Electrostatic Double Layer Flash Memory Based on Two-Dimensional Crystals” *2016 AIChE Annual Meeting*, November 14th 2016, San Francisco, CA, USA.
16. **Fullerton Shirey, S.K.**, Xu, K.; Lu, H.; Wang, W.; Kim, H.; Kwak, I.; Cho, K.; Kummel, A.C.; Seabaugh, A. “Nanoionic 2D crystal memory” *Pittsburgh Quantum Institute (PQI) 2016: Quantum Challenges*, April 20th 2016, Pittsburgh, PA, USA.
15. **Fullerton-Shirey, S.K.** “Engineering the interplay between ion and electron transport for low-power transistors and memory” *Annual Meeting of the American Institute of Chemical Engineers (AIChE)* November 2015, Salt Lake City, UT, USA.
14. **Fullerton-Shirey, S.K.**; Lu, H.; Wang, W.; Kim, H.; Kwak, I.; Furuyama, T.; Kobayashi, N.; Cho, K.; Kummel, A.; Seabaugh, A. “Nanometer-thick Ion Conductors for 2D Crystal Memory” *57th Electronic Materials Conference* June 2015, Columbus, OH, USA.
13. Schaetzl, D.; Li, P.; Bernstein, G.H.; **Fullerton-Shirey, S.K.**; “Magnetic Alignment of Gamma (core)/Alpha (shell) Fe₂O₃ Nanorods in a Solid Polymer Electrolyte” *225th ECS meeting*, May 2014, Orlando, FL, USA.
12. Schaetzl, D.; Li, P.; Bernstein, G.H.; Seabaugh, A.; **Fullerton Shirey, S.K.** “Aligning high-aspect-ratio nanofillers in solid polymer electrolytes for Li-ion batteries” *55th Electronic Materials Conference*, June 2013, Notre Dame, IN, USA, .
11. Do, N.S.; Seabaugh, A.; **Fullerton Shirey, S.K.** “Influence of nanofiller shape and aspect ratio on the ionic conductivity and thermal properties of solid polymer electrolytes for rechargeable Li-ion batteries” *55th Electronic Materials Conference*, June 2013, Notre Dame, IN, USA, .
10. Elliott, L.C.C.; Jing, B.; Akgun, B.; Zhu, Y.; Bohn, P.W.; **Fullerton Shirey, S.K.** “Small molecule drug loading and distribution in poly(N-isopropylacrylamide) brushes and its effect on the lower critical solution temperature - a neutron reflectometry and AFM study” *Materials Research Society Fall Meeting*, November 2012, Boston, MA, USA.
9. Do, N.S.; Schaetzl, D. Dey, B., Seabaugh, A.C., **Fullerton Shirey, S.K.** “Influence of Fe₂O₃ nanofiller shape on the conductivity and thermal properties of solid polymer electrolytes: nanorods versus nanospheres” *Gordon Research Conference - Batteries*, March 2012, Ventura, CA USA. Poster.
8. **Fullerton Shirey, S.K.**; Do, S.; Schaetzl, D.; Dey, B.; Seabaugh, A.C. “Improving conductivity in solid polymer electrolytes using oxide nanorods”, *220th ECS Meeting*, October 2011. Boston, MA USA.
7. **Fullerton Shirey, S.K.**; Maranas, J.K. “The effect of LiClO₄ on the structure and mobility of PEO-based solid polymer electrolytes” *Frank J. Padden Jr. Award Symposium, American Physical Society* - award winner March 2009. Pittsburgh, PA USA.
6. **Fullerton, S.K.**; Maranas, J.K. “Influence of humidity and crystallization time on the ionic conductivity of nanoparticle-filled solid polymer electrolytes” *American Physical Society*, March 2007. Denver, CO USA.
5. **Fullerton, S.K.**; Maranas, J.K. “PEO mobility in solid polymer electrolytes as a function of nanoparticle concentration as measured by quasi-elastic neutron scattering” *Gordon Research Conference - Polymer Physics*, July 2006, New London, CT USA. Poster.
4. **Fullerton, S.K.**; Maranas, J.K. “PEO mobility in nanoparticle-filled polymer electrolytes as measured by neutron scattering” *American Physical Society*, March 2006. Baltimore, MD USA.

3. **Fullerton, S.K.**; Maranas, J.K. “PEO mobility in nanoparticle-filled polymer electrolytes as measured by neutron scattering” *American Institute of Chemical Engineers*, November 2005. Cincinnati, OH USA.
2. **Fullerton, S.K.**; Maranas, J.K. “Simulations of amorphous nanoparticles: the effect of shape on surface structure and subsequent interactions with the surroundings” *American Physical Society*, March 2005. Los Angeles, CA USA.
1. **Fullerton, S.K.**; Maranas, J.K. “A molecular interpretation of vitreous boron oxide dynamics” *American Institute of Chemical Engineers*, November 2003. San Francisco, CA USA.

(ii) FULLERTON AS DIRECTING AUTHOR

38. Xu, K.; Woepfel, A.; Liang, J.; Kozhakhmetov, A.; Awate, S.; Robinson, J.; **Fullerton, S.**; “Single versus Dual Ion Conductors for Electric Double Layer Gating of Two-Dimensional Materials” *Materials Research Society (MRS) Fall Meeting*, virtual.
37. Wang, H.; Awate, S.; **Fullerton, S.K.** “Impact of Salt and Solvent Identity on the Deposition of a Cobalt Crown Ether Phthalocyanine Monolayer Electrolyte” *Materials Research Society (MRS) Fall Meeting*, virtual.
36. Chao, Z.; Xu, K.; **Fullerton-Shirey, S.K.**; “Ionic Liquid Regulated Silver Filament Formation in a Solid Polymer Electrolyte for Neuromorphic Applications” *Materials Research Society (MRS) Fall Meeting*, virtual.
35. Liang, J.; Xu, K.; Arora, S.; Laaser, J.; **Fullerton, S.** “Ion-Locking in Solid Polymer Electrolytes for Reconfigurable Gateless Electrostatic Doping” *Materials Research Society (MRS) Fall Meeting*, virtual.
34. Awate, S.; Xu, K.; Liang, J.; Hunt, B.; **Fullerton, S.** “High-Speed Two-Dimensional Solid-State Non-Volatile Memory Based on Electric Double Layer Gating with a Monolayer Electrolyte” *Materials Research Society (MRS) Spring Meeting*, Postponed because of COVID and held virtually Fall 2020.
33. Xu, K.; Liang, J.; Bostian, E.; Woepfel, A.; Ding, H.; Beckman, B.; **Fullerton-Shirey, S.K.**; “Electric Double Layer Gating of Two-Dimensional Field-Effect Transistors Using a Single-Ion Conductor” *Materials Research Society (MRS) Fall Meeting*, December 2nd, 2019. Boston, MA, USA.
32. Chao, Z.; Crouch, G.; Bohn, P.; Go, D.; **Fullerton Shirey, S.K.** “Tunable Silver Nanofilament Formation Dynamics in Polymer/Ionic Liquid Electrolyte Composites by Direct-Write” *Materials Research Society (MRS) Fall Meeting*, December 2nd, 2019. Boston, MA, USA.
31. Woepfel, A.;* Xu, K.; **Fullerton, S.**; “Locally Induced Semiconductor-to-Metal Transition in Two-Dimensional Crystals Through Use of an Ionomer”, *7th Graphene and Beyond: From Atoms to Applications Workshop*, Pennsylvania State University, May 2019, University Park, PA, USA. Poster
30. Awate, S.;* Liang, J.; Xu, K.; **Fullerton Shirey, S.K.** “Two-dimensional solid-state non-volatile memory based on electric double layer gating with a monolayer electrolyte ” *7th Graphene and Beyond: From Atoms to Applications Workshop*, Pennsylvania State University, May 2019, University Park, PA, USA. Poster
29. Liang, J.;* Xu, K.; Woepfel, A.; **Fullerton-Shirey, S.K.** “Electric double layer gating 2D FETs using a single-ion conductor to access the semiconductor to metal phase transition”, *2019 Graphene and Beyond: From Atoms to Applications Workshop*, Pennsylvania State University, May 2019, University Park, PA, USA. Poster.
28. Liang, J.;* Xu, K.; Wu, M.; Hunt, B.; Wang, W.; Cho, K.; **Fullerton-Shirey, S.K.** “Solid state non-volatile memory enabled by the monolayer electrolyte”, *Pittsburgh Quantum Institute (PQI)*

Annual Conference, April 2019, University of Pittsburgh, Pittsburgh, PA, USA. Poster.

27. Chao, Z.;* Evelyn, A.; **Fullerton Shirey, S.K.** “Direct-Write Formation and Dissolution of Silver Nanofilaments in Ionic Liquid-Polymer Electrolyte Composites” *Pittsburgh Quantum Institute (PQI) Annual Conference*, April 2019, University of Pittsburgh, Pittsburgh, PA, USA. Poster.

26. Woeppel, A.;* Xu, K.; Fullerton, S.K. “Locally Induced Semiconductor-to-Metal Transition in Two-Dimensional Crystals Through Use of an Ionomer” *Pittsburgh Quantum Institute (PQI) Annual Conference*, April 2019, University of Pittsburgh, Pittsburgh, PA, USA. Poster.

25. Liang, J.*; Xu, K.; **Fullerton-Shirey, S.K.**, “Electric double layer gating of WSe₂ field-effect transistors using a monolayer electrolyte capped with h-BN”, *AIChE Annual meeting*, October 2018, Pittsburgh, PA, USA.

24. Chao, Z.; Crouch, G.; Han, D.; Bohn, P.; Go, D.; **Fullerton Shirey, S.K.** “Formation/dissolution of silver filaments through an ionic liquid-polymer electrolyte composite” *AIChE Annual meeting*, October 2018, Pittsburgh, PA, USA. Poster

23. Woeppel, A.;* Xu, K.; Fullerton, S. “Modeling Electric Double Layer Formation and Strain Induced by a Single-Ion Conducting Polymer on a Two-Dimensional Crystal” *AIChE Annual meeting*, October 2018, Pittsburgh, PA, USA. Poster

22. Bostian, E.;* Xu, K.; Woeppel, A.; Ding, H.; McKone, J.; Beckman, E.; Fullerton Shirey, S.K. “Fabrication and characterization of ionomer-gated MoTe₂ field-effect transistors” *AIChE Annual meeting*, October 2018, Pittsburgh, PA, USA.

21. Chao, Z. ; **Fullerton-Shirey, S.K.** “Formation and dissolution of conductive silver filaments through a PEGDA/Ionic liquid thin film- Towards the development of a polymer coating with reconfigurable optical properties” *PPG Innovation Center*, Nov 2018, Allison Park, PA, USA, Oral

20. Xu, K.;* Bostian, E.; Woeppel, A.; Liang, J.; Ding, H.; Beckman, E.; Fullerton Shirey, S.K. “Using Ions to Control Transport in Two-Dimensional Materials: A New Approach to Accessing the Semiconductor-to-metal Transition” *IEEE 13th Nanotechnology Materials & Devices Conference (NMDC 2018)*, Oct 2018, Portland, Oregon, USA.

19. Liang, J.;* Xu, K.; Fullerton-Shirey, S.K. “Bistability in electric double layer gated WSe₂ field-effect transistors using monolayer electrolyte capped with h-BN”, *Pittsburgh Quantum Institute (PQI) Science 2018*, Oct 2018, University of Pittsburgh, Pittsburgh, PA, USA. Poster.

18. Xu, K.;* Lin, Y.-C.; Robinson, J.; Guzman, D.; Strahan, A.; Seabaugh, A.; **Fullerton Shirey, S.K.** “Millisecond pulse dynamics of electric double layers formed on graphene field-effect transistors” *5th Electronic Materials Conference*, June 2017, University of Notre Dame, Notre Dame, IN, USA.

17. Liang, J.;* Xu K.; **Fullerton Shirey, S.K.**; “Electric Double Layer Doping of WSe₂ Field-Effect Transistors Using a Monolayer Electrolyte” *Electrochemical Society (ECS) spring meeting* May 16th 2018, Seattle, WA, USA.

16. Liang, J.;* Xu K.; **Fullerton Shirey, S.K.**; “Removing PMMA residue on MoS₂ and WSe₂ field effect transistors using a contact mode atomic force microscope” *Graphene and Beyond - Penn State University*, May 2018, University Park, PA, USA. Poster.

15. Chao, Z.;* Crouch, G.; Han, D.; Bohn, P.; Go, D.; **Fullerton Shirey, S.K.** “Formation/dissolution dynamics of conductive silver filaments through an ionic liquid/ polymer electrolyte thin film” *Electrochemical Society (ECS) spring meeting* May 29th 2017, New Orleans, LA, USA.

14. Liang, J.;* Xu K.; Jordache, M.; **Fullerton Shirey, S.K.**; “MoS₂ field-effect transistors gated with a monolayer electrolyte” *Electrochemical Society (ECS) spring meeting* May 29th 2017, New Orleans,

LA, USA.

13. Liang, J.;* Xu, K.; **Fullerton-Shirey, S.K.** “Deposition and characterization of monolayer electrolyte cobalt crown-ether phthalocyanine/LiClO₄ on MoS₂ FETs” *Graphene and Beyond: From Atoms to Applications - Penn State University*, May 10th, 2017, University Park, PA, USA. Poster.
12. Xu, K.;* Lu, H.; Kinder, E.; Kummel, A.; Seabaugh, A.; **Fullerton, S.** “Ion-Doping of Graphene FETs Using a Two-Dimensional Solid-State Electrolyte” *58th Electronic Materials Conference*, June 2016, University of Delaware, Newark, DE, USA.
11. Xu, K.;* Chu, T.; Bourdon, B.; Seabaugh, A.; Chen, Z.; **Fullerton-Shirey, S.K.** “Reconfigurable *p-n* junction formation and bandgap opening in bilayer graphene using polyethylene oxide and CsClO₄ solid polymer electrolyte” *Pittsburgh Quantum Institute (PQI) 2016: Quantum Challenges*, April 2016, Pittsburgh, PA USA. Poster.
10. Kinder, E.W.;* Fuller, A.; **Fullerton, S.K.** “Room temperature static doping of 2D crystals using an ion-locking electrolyte” *MRS Spring Meeting*, March 2016, Phoenix, AZ, USA.
9. Xu, K.;* Chu, T.; Bourdon, B.; Seabaugh, A.; Chen, Z.; **Fullerton-Shirey, S.K.** “Reconfigurable *p-n* junction formation and bandgap opening in bilayer graphene using polyethylene oxide and CsClO₄ solid polymer electrolyte” *73rd Device Research Conference*, June 2015, Columbus, OH, USA. Poster.
8. Kinder, E.* and **Fullerton, S.K.** “Ion-Locking Method for Doping Atomically-Thin Transistors” *11th International Nanotechnology Conference on Communication and Cooperation*, May 2015, Fukouka-city, Fukouka, Japan. Poster.
7. Kinder, E.* and **Fullerton, S.K.** “PVA:LiClO₄: a robust, high Tg polymer electrolyte for adjustable ion gating of 2D materials” *American Physical Society*, March 2015, San Antonio, TX, USA.
6. Li, H.-M.;* Bourdon, B.; Lin, Y.-C.; Robinson, J.; Seabaugh A.; **Fullerton, S.** “Dynamics of Ion-Gating 2D Crystals Using a Solid Polymer Electrolyte” *American Physical Society*, March 2015, San Antonio, TX, USA.
5. Li, H.-M.;* Bourdon, B.; Lin, Y.-C.; Robinson, J.; Seabaugh, A.; **Fullerton, S.K.** “Temperature dependence of ion transport in solid polymer electrolytes for electrostatic gating of 2D crystals” *The 2nd Muju International Winter School Series (MIWS2-2015)*, January 2015, Muju Deogyusan Resort, Republic of Korea. Poster.
4. Xu, H.;* Kinder, E.; Fathipour, S.; Seabaugh, A.; **Fullerton-Shirey, S.K.** “Reconfigurable Ion Doping in 2H-MoTe₂ Field-Effect Transistors Using PEO:CsClO₄ Electrolyte” *ISCS 2014 The 41st International Symposium on Compound Semiconductor*, May 2014, Montpellier, France.
3. Kinder, E.;* Lu, H.; Hwang, W.S.; Cho, B.J.; Hong, S.-K.; Seabaugh, A.; **Fullerton-Shirey, S.K.** “Field-Controlled Ion Doping of Graphene” *225th ECS meeting*, May 2014, Orlando, FL, USA.
2. Kinder, E.;* Yan, R.; Xing, H.; **Fullerton-Shirey, S.K.**; “Field-Effect Doping of MoS₂ Using a Solid Polymer Electrolyte” *225th ECS meeting*, May 2014, Orlando, FL, USA.
1. Bohn, P.;* Elliott, L.; **Fullerton-Shirey, S.K.** “Single Molecule Tracking as a Probe of Stimulus-Responsive Behavior in Gradient-Presenting Materials” *Fall MRS meeting*, Nov 2011, Boston, MA.

(ii). FULLERTON AS CO-AUTHOR

30. Kozhakhmetov, A.; Nasr, J.R.; Zhang, F.; Xu, K.; Briggs, N.C.; Cormier, C.R.; Addou, R.K.; Das, S.; Terrones, M.; Wallace, R.; Fullerton-Shirey, S.; Robinson, J.A. “Scalable Synthesis of BEOL compatible 2D WSe₂” *61st Electronic Materials Conference (EMC)* June 27th 2019, Ann Arbor, MI, USA.

29. Subramanian, S.; Wang, Y.; Moser, S.; Xu, K.; Fullerton-Shirey, S.K.; Robinson, J.A. "Direct Visualization of the Graphene/MoS₂ Heterostructure Interface" *61st Electronic Materials Conference (EMC)* June 27th 2019, Ann Arbor, MI, USA.
28. Subramanian, S.;* Xu, K.; Deng, D.; Li, J.; **Fullerton Shirey, S.K.**; Robinson, J.A. "Tunable as-grown graphene contacts to semiconducting transition metal dichalcogenides" *4th IEEE International Conference on Emerging Electronics (ICEE)* Dec 2018, Yelahanka, Bangalore, India.
27. Zhang, K.;* Bersch, B.M.; Zhang, F.; Briggs, N.; Xu, K.; Wang, K.; Chubarov, M.; Redwing, J.M.; **Fullerton-Shirey, S.**; Terrones, M.; Robinson, J. "Sodium Chloride Induced Heterogeneities in Epitaxial MoS₂" *MRS Fall Meeting*, December 2018, Boston, MA, USA.
26. Deng, D.;* Subramanian, S.; Zhang, K.; Perkins, K.; Xu, K.; Li, J.; Feenstra, R.M.; **Fullerton-Shirey, S.K.**; Robinson, J. "Understanding the Role of the Contact- Material Interface in a MoS₂ Chemical Gas Sensor Using Directly Grown Graphene-MoS₂ Lateral Heterostructures" *MRS Fall Meeting*, December 2018, Boston, MA, USA.
25. Zhang, K.;* Bersch, B.; Borys, N.; Xu, K.; Feng, S.; Joshi, J.D.; Addou, R.; Zhang, C.; Wang, K.; Wallace, R.; Cho, K.; Vora, P.; Terrones, M.; **Fullerton-Shirey, S.K.**; Schuck, P.J.; Robinson, J. "In Situ Substitutional Doping of Monolayer MoS₂—The Significance of Substrates" *MRS Fall Meeting*, December 2018, Boston, MA, USA.
24. Subramanian, S.;* Deng, D.D.; Xu, K.; Simonson, N.; Wang, K.; Li, J.; Feenstra, R.M.; **Fullerton-Shirey, R.**; Robinson, J.A. "Tunable As-Grown Graphene Contacts to Semiconducting Transition Metal Dichalcogenides" *60th Electronic Materials Conference* June 2018, Santa Barbara, CA, USA.
23. Heidarlou, M.A.;* Jariwala, B.; Paletti, P.; Rouvimov, S.; Robinson, J.A.; **Fullerton-Shirey, S.K.**; Seabaugh, A. "Supercapacitance charge release in a CVD-grown WSe₂ FET incorporating PEO:CsClO₄ side gate" *Device Research Conference (DRC)* June 2018, Santa Barbara, CA, USA.
22. Bersch, B.;* Lin, Y.-C.; Jariwala, B.; Xu, K.; Eichfeld, S.; Choudhury, T.; Wang, B.; Pan, Yi; Li, J.; Fölsch, S.; Feenstra, R.; Addou, R.; Haque, A.; Wallace, R.; **Fullerton, S.**; Redwing, J.; Robinson, J.; "Scalable Epitaxial Tungsten Diselenide Atomic Layers Grown via Metal Organic Chemical Vapor Deposition - Transistor Performance and Outlook" *MRS Fall meeting*, November 27th, 2017 Boston, MA, USA.
21. Fathipour, S.;* Li, H.; Paletti, P.; Remškar, M. **Fullerton Shirey, S.K.**; Seabaugh, A.; "First synthesized WS₂ nanotube and nanoribbon field effect transistors grown by chemical vapor transport" *75th Device Research Conference*, June 2017, University of Notre Dame, Notre Dame, IN USA.
20. Fathipour, S.;* Paletti, P.; Jariwala, B.; Park, J.H.; Kummel, A.; Robinson, J.; **Fullerton Shirey, S.K.**; Seabaugh, A.; "Homojunction WSe₂ Tunnel Field-effect Transistors" *TECHCON 2017*, September 2017, Austin, TX, USA.
19. Kummel, A.;* Fathipour, S.; Park, J.H.; Kwak, I.; Sardashti, K. Vishwanath, S.; Xing, H.G.; **Fullerton Shirey, S.K.**; Seabaugh, A.; Movva, H.; Banerjee, S.K.; Rai, A. "Self Assembled Ordered Phthalocyanine Monolayers on 2D Semiconductors for Subnanometer Dielectric ALD Nucleation" *Pacific Rim Meeting on Electrochemical and Solid-State Science, PRIME 2016*, October 2016, Honolulu, Hawaii, USA.
18. Fathipour, S.;* Park, J.H.; Kummel, A.; **Fullerton Shirey, S.K.**; Seabaugh, A.C. "2D Crystal Tunnel Field Effect Transistors" *TECHCON 2016*, September 2016, Austin, TX, USA.
17. Seabaugh, A.;* Fathipour, S.; Li, H.; Paletti, P.; Kinder, E.; Liu L.; Lu H.; Asghari, M.; Gonzalez, K.; Pandey, P.; Alessandri C.; Remskar, M.; **Fullerton-Shirey, S. K.** "Electric-double-layer field-effect transistors using polyethylene-oxide cesium perchlorate on two-dimensional materials" *Flatlands*

Beyond Graphene 2016 , July 2016, Bled, Slovenia; Invited.

16. Fathipour, S.;* Paletti, P.; **Fullerton-Shirey, S.**; Seabaugh, A. “Demonstration of electric double layer p-i-n junction in WSe₂” *74th Device Research Conference*, June 2016, University of Delaware, Newark, DE, USA.
15. Li, M.O.;* Xiao, S.; Yan, R.; Vishwanath, S.; **Fullerton-Shirey, S.**; Jena, D.; Xing, H.G. “Fermi Level Tunability of A Novel 2D Crystal: Tin Diselenide (SnSe₂)” *74th Device Research Conference*, University of Delaware, June 2016, Newark, DE, USA.
14. Kummel, A.;* Park, J.H.; Kwak, I.; Chagarov, E.; Movva, H.; Chou, H.; Banerjee, S.K.; Fathipour, S.; Seabaugh, A.; **Fullerton, S.**; Vishwanath, S.; Xing, H.G.; Choudhury, P. “Phthalocyanine Monolayer Nucleation of Gate Oxide ALD on Single Layer Graphene and TMD Surfaces” *Electrochemical Society Spring Meeting*, June 2016, San Diego, CA, USA, Invited.
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