

Justin L. Andrews, Ph.D.

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PROFESSIONAL APPOINTMENTS

Position: Assistant Professor of Chemistry *Beginning Aug. 2023*
University: Purdue University, West Lafayette, IN, USA

Position: Postdoctoral Research Associate *Jan. 2021–Aug. 2023*
University: Massachusetts Institute of Technology, Cambridge, MA, USA
Advisor: Prof. Mircea Dincă, W. M. Keck Professor of Energy, Professor of Chemistry

ACADEMIC HISTORY

Degree: Ph.D., Chemistry *Defended Dec. 2020*
University: Texas A&M University, College Station, TX, USA
Advisor: Sarbajit Banerjee, Davison Chair, Professor of Chemistry and Materials Science & Engineering
Dissertation: “Mass and Charge Transport in Metastable Vanadium Oxides: Implications for Electrochemical Energy Storage, Neuromorphic Computing, and Photocatalysis”

Degree: B.S., Chemistry *Conferred May 2014*
University: Gordon College, Wenham, MA, U.S.
Advisor: Irvin J. Levy, FACS

AWARDS, HONORS, & FELLOWSHIPS

- 2021** G. Michael Bancroft Ph.D. Thesis Award | Canadian Light Source (SK, CA)
([Link to Announcement and Description](#))
Description: Awarded for best doctoral dissertation based on work performed at the Canadian Light Source in academic calendar year 2020-2021
- 2021** International Union of Pure and Applied Chemistry (IUPAC)-Solvay International Award for Young Chemists | International Union of Pure and Applied Chemistry (NC, US) | ([Link to Announcement and Description](#))
Description: One of five selected globally by IUPAC to recognize impactful doctoral dissertations in the chemical sciences in academic calendar year 2020-2021
- 2021** George W. Kunze Endowed Graduate Student Award | Texas A&M University
([Link to Announcement and Description](#))
Description: Awarded for most outstanding research by a current doctoral student at Texas A&M University in any discipline in academic calendar year 2020-2021
- 2021** Texas A&M University Distinguished Dissertation Award | Texas A&M University, Graduate and Professional School | ([Link to Announcement and Description](#))
Description: Awarded for best doctoral dissertation at Texas A&M University in Mathematics, Physical Sciences and Engineering in academic calendar year 2020-2021
- 2021** Association of Former Students Distinguished Graduate Student Dissertation Award for Excellence in Research | Texas A&M University, Association of Former Students | ([Link to Announcement and Description](#))
Description: One of ten dissertations selected from Texas A&M University to recognize impactful doctoral dissertations (all disciplines) in academic calendar year 2020-2021

- 2017-2020** NASA Space Technology Research Fellow | National Aeronautics and Space Administration
 Awarded for the development of beyond Li-ion battery technologies for aerospace applications
 (Link to Announcement and Description)
Description: Fellowship sponsors graduate students who show significant potential to contribute to NASA's goal of creating innovative new space technologies for the USA's science, exploration and economic future
- 2020** MRS Graduate Student Silver Award | The Materials Research Society (PA, US)
 (Link to Announcement and Description)
Description: One of twelve selected for award that "...recognizes students of exceptional ability who show promise for significant future achievement in materials research."
- 2020** Best Poster Award, 2020 Molecular Foundry User Meeting | The Molecular Foundry (CA, US)
 (Link to Announcement and Description)
- 2019** DOW Chemical Charlene Black Miller '79 Endowed Memorial Fellowship | Texas A&M University, Department of Chemistry | (Link to Announcement and Description)
Description: Highest award given to a graduate student in the Texas A&M Department of Chemistry
- 2019** Sharon Dabney Research and Service Award | Phi Lambda Upsilon, The National Honorary Chemistry Society (FL, US) | (Link to Announcement and Description)
Description: Awarded to a Texas A&M University graduate student for excellence in service and research
- 2019** Excellence in STEM Award | Texas A&M University Chapter of the Sigma Xi Scientific Honor Society (NC, US) | (Link to Announcement and Description)
Description: Awarded for best presentation at Texas A&M University student research week
- 2019** Best Poster Award, DOW Chemical Graduate Student Symposium | DOW Chemical Company (MI, US)
 (Link to Announcement and Description)
Description: Awarded by committee comprising five senior DOW scientists for excellence in research with industrial relevance
- 2019** Sigma Xi Graduate Student Travel Award | Sigma Xi Scientific Honor Society (NC, US)
 (Link to Announcement and Description)
- 2019** Donald J. Darensbourg Graduate Student Travel Scholarship | Texas A&M University, Department of Chemistry | (Link to Announcement and Description)
Description: Most prestigious travel award in the TAMU Department of Chemistry given for excellence in research
- 2019** Office of Graduate and Professional Studies Travel Award | Texas A&M University, Office of Graduate and Professional Studies
 (Link to Announcement and Description)
- 2018** Wilhelm und Else Heraeus Stiftung Preis | Wilhelm and Else Heraeus Foundation (Germany)
 (Link to Description)
Description: Awarded for best presentation at the international Wilhelm and Else Heraeus seminar on automotive propulsion
- 2018** Best Poster Award Finalist Fall MRS Meeting | The Materials Research Society
- 2018** PLU Travel Award | Phi Lambda Upsilon, The National Honorary Chemistry Society
 (Link to Announcement)
- 2010-2014** AJ Gordon Fellowship | Gordon College
 (Link to Description)
Description: AJ Gordon Leadership and Mentoring Fellowship – Mentored a group of 24 AJ Gordon Fellows as a Sophomore and Junior at Gordon College

RESEARCH EXPERIENCES AND PROFESSIONAL TRAINING

- 2019** Visiting Space Technology Research Fellow | Marshall Space Flight Center, NASA
Description: Worked under the guidance of research collaborator Curtis Hill (CEO, CK Technologies) to incorporate multivalent and aqueous battery technologies into flexible 3D printed circuitry. Gained experience in ink formulation, materials processing, and 3D printing using equipment from NASA's "In Space" manufacturing initiative.
- 2018** Visiting Space Technology Research Fellow | Ames Research Center, NASA
Description: Worked in the 3D and 2D electronics printing laboratory at NASA Ames Research Center. Gained extensive experience in formulating and printing 2D electronics, designing mechanical energy harvesting devices, and designing 2D printed electronics circuitry
- 2019** MIT QS³ Quantum Science Summer School | Hosted by Penn State University and MIT
Description: Attended multi-week summer school at Penn State University (organized by Prof. Joe Checkelsky, MIT) concerning the design of topological insulators and materials exhibiting complex Majorana fermion behavior.
- 2015** Rietveld Refinement School | North American Solid-State Chemistry Conference
Description: Attended school preceding the North American Solid-state Chemistry Conference organized by Saul Lapidus to learn the "ins-and-outs" of Rietveld refinement using TOPAZ software
- 2013** NSF Research Experience for Undergraduates | Bergbreiter Research Group, Texas A&M University
Description: Investigated the design and synthesis of polymer-bound NHC ligand-functionalized Grubbs' catalysts and polymer-bound isocyanide ligands for the selective removal of trace ruthenium leachate from pharmaceutical products. Gained practical experience in organic synthesis.

TEACHING AND LEADERSHIP EXPERIENCE

Laboratory Instructor Experience:

- 2014-** General Chemistry Laboratory (CHE 111/112) | Texas A&M University
2015 *Duties: 20-minute lecture, supervision of 3 hr. lab. experiment, section grading (~60 students/wk)*
- 2015** Molecular Science for Citizens (CHE 116) | Texas A&M University
- 2015** Molecular Science for Citizens Curriculum Design (CHE 116) | Texas A&M University
- 2014** Instrumental Analysis Laboratory Assistant | Gordon College
Duties: Supervised Junior-level Instrumental Analysis Laboratory Class as a Senior at Gordon College
- 2013-** General Chemistry Chief Laboratory Teaching Assistant | Gordon College
2014 *Duties: Prepared laboratory experiments for all lab sections (200+ students per semester)*
- 2012-** General Chemistry Course Grading Assistant | Gordon College
2013 *Duties: Graded laboratory reports and exams for entire general chemistry program*
- 2012-** General Chemistry Laboratory Teaching Assistant | Gordon College
2013 *Duties: Assisted in teaching general chemistry laboratory course*

Graduate Research Mentor (Students Mentored Listed Below):

- Note:** During the course of my graduate and postdoctoral careers, I had the opportunity to mentor and work closely with undergraduate students in their research pursuits. Many of these undergraduate students have made significant contributions towards research publications (as highlighted in the publications list below).
- 2021** Ruby Kharod | Massachusetts Institute of Technology, Department of Chemistry |
Now: Graduate Student at UC Berkeley, Department of Chemistry
- 2019-** Savannah Pas | Texas A&M University, Department of Chemistry
2020 *Now: Graduate Researcher at UT Dallas*
- 2017-** Michelle Gross | Texas A&M University, Department of Chemistry
2018 *Now: Graduate Student, Polymer Science and Engineering, UMass Amherst*
- 2017-** Travis Sandel | Texas A&M University, Department of Chemistry

- 2018** Now: Graduate Student, Materials Science, Texas A&M University
- 2017** Hector Figueroa | Texas A&M University, Department of Chemistry, Visiting REU Student (UPR Cayey)
- 2016** Alec Mohr | Texas A&M University, Department of Chemistry
Now: Research Scientist at Samsung Austin Semiconductor

Leadership Experience in The American Chemical Society:

- 2012-** Student Chapter President | Gordon College, Department of Chemistry
- 2013** Received Outstanding Chapter Award and Green Chapter Award
- 2012-** Student Chapter Treasurer | Gordon College, Department of Chemistry
- 2013** Received Outstanding Chapter Award and Green Chapter Award

PEER-REVIEWED PUBLICATIONS (Links to: [Google Scholar](#) / [LinkedIn](#) / [ORCID](#))

Key: ‡shared authorship, undergraduate author, *corresponding author, Citations:>910 h-index: 16 i10: 24

Previews and Highlights:

- (1) Santos, D. A.‡; Lin, B.‡; **Andrews, J. L.*** “Data science enables X-ray vision.” *Patterns*, **2022**, 3 (12), 100660.
DOI: 10.1016/j.patter.2022.100660 [\(Link to paper\)](#)
- (2) **Andrews, J. L.**; Banerjee, S. “It’s not over until the big ion dances: Potassium gets its groove on.” *Joule*, **2018**, 2 (11), 2194-2197.
DOI: 10.1016/j.joule.2018.11.003 [\(Link to paper\)](#)

Corresponding-authored Publications:

- (3) Santos, D. A.‡; **Andrews, J. L.‡***; Lin, B.; De Jesus, L.R.; Pas, S.; Gross, M. A.; Carillo, L.; Stein, P.; Ding, Y.; Xu, B.-X.; Banerjee, S.* “Mapping composition and stress gradients in intercalation electrode materials using hyperspectral X-ray imaging informed by multivariate data analytics.” *Patterns (In Press)* (IF: 3.19)

First-authored Publications:

- (4) Handy, J. V.‡; **Andrews, J. L.‡**; Zhang, B.‡; Kim, D.; Bhuvanesh, N.; Tu, Q.; Qian, X.; Banerjee, S. “Topochemical stabilization and transformations of single-crystals of metastable 2D γ -V₂O₅: Atomic-resolution mapping of lithium intercalation.” *Cell Reports Physical Science*, **2022**, 3 (1), 100712.
DOI: 10.1016/j.xcrp.2021.100712 (IF: 7.83) [\(Link to paper\)](#)
- (5) **Kharod, R.‡**; **Andrews, J. L.‡**; Dincă, M. Teaching MOFs to conduct: Ionic and electronic conductivity in metal—organic frameworks.” *Annual Reviews of Materials Research*, **2022**, 52, 103-128.
DOI: 10.1146/annurev-matsci-080619-012811 (IF: 13.97) [\(Link to paper\)](#)
- (6) **Andrews, J. L.‡**; Stein, P.‡; Santos, D. A.‡; Chalker, C. J.; De Jesus, L. R.; Davidson, R. D.; **Gross, M. A.**; Pharr, M.; Batteas, J. D.; Xu, B.-X.; Banerjee, S. “Curvature-induced modification of mechano-electrochemical coupling and nucleation kinetics in a cathode material.” *Matter*, **2020**, 3, 1754-1773.
DOI: 10.1016/j.matt.2020.08.030 (IF: 19.97) [\(Link to paper\)](#)
- (7) Santos, D. A.‡; **Andrews, J. L.‡**; Bai, Y.‡; Stein, P.; Luo, Y.; Zhang, Y.; Xu, B.-X.; Banerjee, S. “Bending-driven alteration of phase segregation patterns in individual cathode particles upon lithiation/delithiation.” *Materials Horizons*. **2020**, 7 (12), 3275-3290.
DOI: 10.1039/D0MH01240H (IF: 13.27) [\(Link to paper\)](#)
- (8) Parija, A.‡; Handy, J. V.‡; **Andrews, J. L.‡**; Wu, J.; Wangoh, L.; Singh, S.; Jozwiak, C.; Bostwick, A.; Rotenberg, E.; Yang, W.; Fakra, S. C.; Al-Hashimi, M.; Williams, R. S.; Sambandamurthy, G.; Piper, L. F. J.; Prendergast, D.; Banerjee, S. “Metal-insulator transitions in β '-Cu_xV₂O₅ mediated by polaron oscillation and cation shuttling.” *Matter*, **2020**, 2 (5), 1166-1186.
DOI: 10.1016/j.matt.2020.01.027 (IF: 19.97) [\(Link to paper\)](#)

Selected as a Cover Article at Matter

- (9) **Andrews, J. L.**; Santos, D. A.; Meyyappan, M.; Williams, R. S.; Banerjee, S. "Building brain-inspired logic circuits from dynamically switchable transition-metal oxides."
Trends in Chemistry, **2019**, 1 (8), 711-726.
DOI: 10.1016/j.trechm.2019.07.005 (IF: 22.45) [\(Link to paper\)](#)

Selected as a Cover Article at Trends in Chemistry

- (10) **Andrews, J. L.**‡; Cho, J.‡; Wangoh, L.‡; Suwandarathne, N.‡; Sheng, A.; Chauhan, S.; Nieto, K.; Mohr, A.; Kadassery, K. J.; Sfeir, M.; Lacy, D. C.; Lee, T.-L.; Zhang, P.; Watson, D. F.; Piper, L. F. J.; Banerjee, S. "Hole extraction by design in photocatalytic architectures interfacing CdSe quantum dots with topochemically-stabilized tin vanadium oxide."
Journal of the American Chemical Society, **2018**, 140 (49), 17163-17174.
DOI: 10.1021/jacs.8b09924 (IF: 16.38) [\(Link to paper\)](#)

Selected as a Cover Article at JACS

- (11) **Andrews, J. L.**; Mukherjee, A.; Yoo, H. D.; Parija, A.; Marley, P. M.; Fakra, S.; Prendergast, D.; Cabana, J.; Klie, R. F.; Banerjee, S. "Reversible Mg-ion insertion in a metastable one-dimensional polymorph of V₂O₅."
Chem, **2018**, 4 (3), 564–585.
DOI: 10.1016/j.chempr.2017.12.018 (IF: 22.80) [\(Link to paper\)](#)

Highlighted in AAAS Eureka Alert, NSF News, Nature Nanotechnology Highlights, Joule Previews, Xinhua News, Australia Science TV, ElektronikNet, and The China Global Television Network

- (12) **Andrews, J. L.**; Singh, S.; Kilcoyne, C.; Shamberger, P. J.; Sambandamurthy, G.; Banerjee, S. "Memristive response of a new class of hydrated vanadium oxide intercalation compounds."
MRS Communications, **2017**, 7 (3), 634–641.
DOI: 10.1557/mrc.2017.64 (IF: 2.77) [\(Link to paper\)](#)

- (13) **Andrews, J. L.**‡; De Jesus, L. R.‡; Tolhurst, T. M.‡; Marley, P. M.; Moewes, A.; Banerjee, S. "Intercalation-induced dimensional reduction and thickness-modulated electronic structure of a layered ternary vanadium oxide."
Chemistry of Materials, **2017**, 29 (7), 3285–3294.
DOI: 10.1021/acs.chemmater.7b00597 (IF: 9.81) [\(Link to paper\)](#)

Co-authored Publications:

- (14) Widera, A.; Thony, D.; Aebli, M.; Oppenheim, J. J.; Andrews, J. L.; Eiler, F.; Worle, M.; Schonberg, H.; Weferling, N.; Dinca, M.; Grutzmacher, H. "PH₃ and P₂H₄ – Solid-State Investigation, Storage, and Purification with α-Mg Formate MOF." *Angew. Chem. Int. Ed.* 2023, *Just Accepted*.
DOI: 10.1002/anie.202217534 [\(Link to Paper\)](#)

- (15) Kampouri, S.; Zhang, M.; Chen, T.; Oppenheim, J. J.; Brown, A.; Payne, M.; **Andrews, J. L.**; Sun, J.; Dincă, M. "Pyrogallate-based metal-organic framework with a two-dimensional secondary building unit."
Angewandte Chemie, **2022**, 61, 202213960.
DOI: 10.1002/ange.202213960 [\(Link to Paper\)](#)

- (16) Schofield, P.; Luo, Y.; Zhang, D.; Zaheer, W.; Santos, D.; Agbeworvi, G.; Ponis, J.; Handy, J. V.; **Andrews, J. L.**; Braham, E. J.; Balakrishna, A.; Banerjee, S. "Doping-induced pre-transformation to extended solid-solution regimes in Li-ion batteries"
ACS Energy Letters, **2022**, 7, 3286-3292.
DOI: 10.1021/acseenergylett.2c01868 [\(Link to paper\)](#)

- (17) Schofield, P.; Braham, E. J.; Zhang, B.; **Andrews, J. L.**; Drozdzick, H. K.; Zhao, X.; Zaheer, W.; Gurrola, R. M.; Xie, K.; Shamberger, P. J.; Qian, X.; Banerjee, S. "Decoupling the metal–insulator transition temperature and hysteresis of VO₂ using Ge alloying and oxygen vacancies."
Chemical Communications, **2022**, 58, 6586-6589.
DOI: 10.1039/D2CC01599D [\(Link to paper\)](#)

- (18) Handy, J. V.; **Andrews, J. L.**; Perez-Beltran, S.; Powell, D.; Albers, R.; Whittaker-Brooks, L.; Bhuvanesh, N.; Banerjee, S. "A "Li-Eye" View of Diffusion Pathways in a 2D Intercalation Material from Topochemical Single-Crystal Transformation."
ACS Energy Letters, **2022**, 7, 1960-1962.
DOI: 10.1021/acseenergylett.2c00739 [\(Link to paper\)](#)
Selected as a Cover Article at ACS Energy Letters
- (19) Handy, J. V.; Zaheer, W.; Rothfuss, A.; McGranahan, C.; Agbeworvi, G.; **Andrews, J. L.**; Garcia-Pedraza, K.; Ponis, J.; Ayala, J.; Yu, D.; Watson, D.; Banerjee, S. "Lone but not alone: Precise positioning of lone pairs for the design of photocatalytic architectures."
Chemistry of Materials, **2022**, 34 (4), 1439-1458.
DOI: 10.1021/acs.chemmater.1c03762 [\(Link to paper\)](#)
- (20) Zaheer, W.; Agbeworvi, G.; Perez-Beltran, S.; **Andrews, J. L.**; Aierken, Y.; Weiland, C.; Jaye, C.; Yu, Y.-S.; Shapiro, D. A.; Fakra, S. C.; Fischer, D. A.; Guo, J.; Prendergast, D.; Banerjee, S. "Lessons learned from FeSb₂O₄ on stereoactive lone pairs as a design principle for anion insertion"
Cell Reports Physical Science, **2022**, 2 (10), 100592.
DOI: 10.1016/j.xcrp.2021.100592 [\(Link to paper\)](#)
Featured as Editor's Choice 2021
- (21) Johnson, I. D.; Nolis, G.; Yin, L.; Yoo, H. D.; Parajuli, P.; Mukherjee, A.; **Andrews, J. L.**; Lopez, M.; Klie, R. F.; Banerjee, S.; Ingram, B.; Lapidus, S. H.; Cabana, J.; Darr, J. A. "Enhanced charge storage of nanometric ζ -V₂O₅ in Mg electrolytes."
Nanoscale, **2020**, 12 (43), 22150-22160.
DOI: 10.1039/d0nr05060a [\(Link to paper\)](#)
- (22) Lopez, M.; Yoo, H. D.; Linhua, H.; **Andrews, J. L.**; Banerjee, S.; Cabana, J. "Does water enhance Mg intercalation in oxides? The case of a tunnel framework."
ACS Energy Letters, **2020**, 5, 3357-3361.
DOI: 10.1021/acseenergylett.0c01681 [\(Link to paper\)](#)
- (23) Handy, J. V.; Luo, Y.; **Andrews, J. L.**; Bhuvanesh, N.; Banerjee, S. "An atomic view of cation diffusion pathways from single-crystal topochemical transformations."
Angewandte Chemie International Edition, **2020**, 59, 16385-16392.
DOI: 10.1002/anie.202005513 [\(Link to paper\)](#)
- (24) Zaheer, W.; **Andrews, J. L.**; Parija, A.; Hylar, F. P.; Jaye, C.; Weiland, C.; Yu, Y.-S.; Shapiro, D. A.; Fischer, D. A.; Guo, J.; Velazquez, J. M.; Banerjee, S. "Reversible room-temperature fluoride-ion insertion in a tunnel-structured transition metal oxide host."
ACS Energy Letters, **2020**, 5, 2520-2526.
DOI: 10.1021/acsenergylett.0c01328 [\(Link to paper\)](#)
Selected as a Cover Article at ACS Energy Letters
- (25) Shi, Y.; Yang, C.; Liang, Y.; **Andrews, J. L.**; Hui, D.; Mengying, Y.; Wenyue, D.; Banerjee, S.; Halesh, A.; Robertson, M.; Cui, X.; Yan, Y. "Chemically inert covalently networked triazole-based solid polymer electrolytes for stable all-solid-state lithium batteries."
Journal of Materials Chemistry A, **2019**, 7 (34), 19691-19695.
DOI: 10.1039/C9TA05885K [\(Link to paper\)](#)
- (26) Fleer, N. A.; Melonie, T.; **Andrews, J. L.**; Waetzig, G.; Gonzalez, O.; Liu, G.-W.; Guiton, B.; Banerjee, S. "Synthetic routes to metastable cubic HfO₂ and HfV₂O₇ from the core-shell arrangement of precursors."
Nanoscale, **2019**, 11, 21354-21363.
DOI: 10.1039/C9NR07316G [\(Link to paper\)](#)
- (27) Davidson, R. D.; Cubides, Y.; **Andrews, J. L.**; McLain, C. M.; Castaneda, H.; Banerjee, S. "Magnesium nanocomposite coatings for protection of a lightweight Al alloy: Modes of corrosion protection, mechanisms of failure."
Physica Status Solidi a., **2019**, 216 (13), 1800817.
DOI: 10.1002/pssa.201800817 [\(Link to paper\)](#)

- (28) Cho, J.; Shen, A.; Suwandaratne, N.; Wangoh, L.; **Andrews, J. L.**; Zhang, P.; Piper, L. F. J.; Watson, D.; Banerjee, S. "The middle road less taken: Electronic-structure-inspired design of hybrid photocatalytic platforms for solar fuel generation." *Accounts of Chemical Research*, **2019**, 52 (3), 645-655.
DOI: 10.1021/acs.accounts.8b00378 [\(Link to paper\)](#)
- (29) Luo, Y.; De Jesus, L. R.; **Andrews, J. L.**; Parija, A.; Fleeer, N.; Robles, D. J.; Mukherjee, P. P.; Banerjee, S. "Roadblocks in cation diffusion pathways: Implications of phase boundaries for Li-ion diffusivity in an intercalation cathode material." *ACS Applied Materials & Interfaces*, **2018**, 10 (36), 30901-30911.
DOI: 10.1021/acsami.8b10604 [\(Link to paper\)](#)
- (30) Parija, A.; Waetzig, G. R.; **Andrews, J. L.**; Banerjee, S. "Traversing energy landscapes away from equilibrium: Strategies for accessing and utilizing metastable phase space." *Journal of Physical Chemistry C*, **2018**, 122 (45), 25709-25728.
DOI: 10.1021/acs.jpcc.8b04622 [\(Link to paper\)](#)
- (31) De Jesus, L. R.; **Andrews, J. L.**; Parija, A.; Banerjee, S. "Defining diffusion pathways in intercalation cathode materials: Some lessons from V₂O₅ on directing cation traffic." *ACS Energy Letters*, **2018**, 3 (4), 915-931.
DOI: 10.1021/acseenergylett.8b00156 [\(Link to paper\)](#)
- (32) Parija, A.; Choi, Y.-H.; Liu, Z.; **Andrews, J. L.**; De Jesus, L. R.; Fakra, S. C.; Al-Hashimi, M.; Batteas, J. D.; Prendergast, D.; Banerjee, S. "Mapping catalytically relevant edge electronic states of MoS₂." *ACS Central Science*, **2018**, 4 (4), 493-503.
DOI: 10.1021/acscentsci.8b00042 [\(Link to paper\)](#)
- (33) De Jesus, L. R.; Stein, P.; **Andrews, J. L.**; Luo, Y.; Xu, B.-X.; Banerjee, S. "Striping modulations and strain gradients within individual particles of a cathode material upon lithiation." *Materials Horizons*, **2018**, 5, 486-498.
DOI: 10.1039/C8MH00037A [\(Link to paper\)](#)
- (34) Braham, E. J.; **Andrews, J. L.**; Alivio, T. E. G.; Fleeer, N. A.; Banerjee, S. "Stabilization of a metastable tunnel-structured orthorhombic phase of VO₂ upon iridium doping." *Physica Status Solidi a*, **2018**, 215 (16), 1700884.
DOI: 10.1002/pssa.201700884 [\(Link to paper\)](#)
Selected as a Cover Article at PSSa
Recognized by PSSa as a Top 10%
Most Downloaded Article, 2018
- (35) Horrocks, G. A.; Parija, A.; De Jesus, L. R.; Wangoh, L.; Sallis, S.; Luo, Y.; **Andrews, J. L.**; Jude, J.; Jaye, C.; Fischer, D. A.; Prendergast, D.; Piper, F. J.; Banerjee, S. "Mitigating cation diffusion limitations and intercalation-induced framework transitions in a 1D tunnel-structures polymorph of V₂O₅." *Chemistry of Materials*, **2017**, 29 (24), 10386-10397.
DOI: 10.1021/acs.chemmater.7b03800 [\(Link to paper\)](#)
- (36) Horrocks, G. A.; De Jesus, L. R.; **Andrews, J. L.**; Banerjee, S. "X-ray spectroscopy and imaging as multiscale probes of intercalation phenomena in cathode materials." *JOM: Journal of the Materials, Metals & Minerals Society* **2017**, 69 (9), 1469-1477.
DOI: 10.1007/s11837-017-2398-3 [\(Link to paper\)](#)
- (37) Tolhurst, T. M.; **Andrews, J. L.**; Leedahl, B.; Marley, P. M.; Banerjee, S.; Moewes, A. "Structure-induced switching of the band gap, charge order, and correlation strength in ternary vanadium oxide bronzes." *Chemistry – A European Journal*, **2017**, 23 (41), 9846-9856.
DOI: 10.1002/chem.201700962 [\(Link to paper\)](#)
- (38) Mukherjee, A.; Klie, R. F.; Yo, H. D.; Nolis, G.; Cabana, J.; **Andrews, J. L.**; Banerjee, S. "Systematic transmission electron microscopy study investigating lithium and magnesium intercalation in vanadium oxide polymorphs." *Microscopy and Microanalysis*, **2017**, 23 (S1), 2012-2013.
DOI: 10.1017/S1431927617010728 [\(Link to paper\)](#)

- (39) Tolhurst, T. M.; Leedahl, B.; **Andrews, J. L.**; Banerjee, S.; Moewes, A. "The electronic structure of ϵ' -V₂O₅: an expanded band gap in a double-layered polymorph with increased interlayer separation." *Journal of Materials Chemistry A*, **2017**, 5 (45), 23694-23703.
DOI: 10.1039/C7TA05066F [\(Link to paper\)](#)
- (40) De Jesus, L. R.; Zhao, Y.; Horrocks, G. A.; **Andrews, J. L.**; Stein, P.; Xu, B.-X.; Banerjee, S. "Lithiation across interconnected V₂O₅ nanoparticle networks." *Journal of Materials Chemistry A*, **2017**, 5 (38) 20141-20152.
DOI: 10.1039/C7TA04892K [\(Link to paper\)](#)
- (41) Parija, A.; Liang, Y.; **Andrews, J. L.**; De Jesus, L. R.; Prendergast, D.; Banerjee, S. "Topochemically de-intercalated phases of V₂O₅ as cathode materials for multivalent intercalation batteries: A first-principles evaluation." *Chemistry of Materials*, **2016**, 28 (16), 5611-5620.
DOI: 10.1021/acs.chemmater.6b01006 [\(Link to paper\)](#)
- (42) Mukherjee, A.; Sa, N.; Phillips, P. J.; **Andrews, J. L.**; Banerjee, S.; Burrell, A. K.; Klie, R. F. "Aberration-corrected STEM and high-resolution EELS study investigating magnesium intercalation in vanadium pentoxide cathode." *Microscopy and Microanalysis*, **2016**, 22 (S3), 1318-1319.
DOI: 10.1017/S1431927616007431 [\(Link to paper\)](#)
- (43) Tolhurst, T. M.; Leedahl, B.; **Andrews, J. L.**; Marley, P. M.; Banerjee, S.; Moewes, A. "Contrasting 1D tunnel-structured and 2D layered polymorphs of V₂O₅: relating crystal structure and bonding to band gaps and electronic structure." *Physical Chemistry, Chemical Physics*, **2016**, 18 (23), 15798-15806.
DOI: 10.1039/C6CP02096H [\(Link to paper\)](#)
- (44) Dennis, R. V.; Patil, V.; **Andrews, J. L.**; Aldinger, J. P.; Yadav, G. D.; Banerjee, S. "Hybrid nanostructured coatings for corrosion protection of base metals: A sustainability perspective." *Materials Research Express*, **2015**, 2 (3), 032001.
DOI: 10.1088/2053-1591/2/3/032001 [\(Link to paper\)](#)
- Recognized by Materials Research Express
as a Top Downloaded Paper, 2015*

POSTER & ORAL PRESENTATIONS

- (1) **Andrews, J. L.**; Banerjee, S. "Bancroft Thesis Award Seminar: Mass and Charge Transport in Metastable Vanadium Oxides: Implications of Electronic Structure on the Design of Materials for Energy Storage." October 7, 2021 (**Oral Presentation, Invited**).
The Canadian Light Source Annual User's Meeting (Online, Bancroft Award Keynote Address)
- (2) **Andrews, J. L.**; Parija, A.; Handy, J.V.; Prendergast, D.; Banerjee, S. "The implications of polarons in tunnel-structured vanadium oxides: Metal-insulator transitions in β -Cu_xV₂O₅ and reversible Mg-ion insertion in ζ -V₂O₅." August 20, 2020 (**Poster Presentation**).
The Molecular Foundry User Meeting (Online)
Received 1st Place Poster Award
- (3) **Andrews, J. L.**; Parija, A.; Handy, J.V.; Banerjee, S. "Surveying metastable phase space for 'transformers': Tuning electron correlation in M_xV₂O₅ materials to realize neuromorphic functionality." April 15, 2020 (**Oral Presentation, Invited**).
Spring meeting of the Materials Research Society (Moved to Fall 2020 due to COVID-19 pandemic)
Awarded MRS Graduate Student Award (Silver)
- (4) **Andrews, J. L.**; Banerjee, S. "Fine-tuning electron correlation in ternary vanadium oxides." December 3, 2019 (**Poster Presentation**).
Fall Meeting of the Materials Research Society (Boston, MA, USA)
- (5) **Andrews, J. L.**; Suwandarathne, N.; Watson, D.; Piper, L.; Guo, J.; Prendergast, D.; Banerjee, S. "Designing catalysts for water splitting based on electronic structure considerations." October 16, 2019 (**Oral Presentation, Invited**).

Electrochemical Society Meeting (Atlanta, GA, USA).

- (6) **Andrews, J. L.**; Parija, A.; Handy, J. V.; Banerjee, S. "Metastability as a tool for tuning electron correlation in vanadium oxides."
August, 1 2019 (**Poster Presentation**).
North American Solid-State Conference (Golden, CO, USA).
- (7) **Andrews, J. L.**; Parija, A.; Handy, J. V.; Banerjee, S. "Tuning electron correlation through metastability in low-dimensional vanadium oxides: Implications for next-generation computing materials and multivalent-ion cathode materials."
June 4, 2019 (**Poster Presentation**).
MIT QS³ Symposium (State College, PA, USA).
- (8) **Andrews, J. L.**; Parija, A.; Handy, J. V.; Banerjee, S. "Tuning electron correlation in metastable vanadium oxides."
May 22, 2019 (**Poster Presentation**).
DOW Chemical Graduate Student Symposium (College Station, TX, USA).
Received 1st Place Poster Award
- (9) **Andrews, J. L.**; Parija, A.; Handy, J. V.; Banerjee, S. "Tuning electron correlation through metastability in low-dimensional vanadium oxides: Implications for next-generation computing materials and multivalent-ion cathode materials."
Apr. 25, 2019 (**Oral Presentation**).
Spring Meeting of the Materials Research Society (Phoenix, AZ, US).
- (10) **Andrews, J. L.**; Parija, A.; Handy, J. V.; Banerjee, S. "Metastability as a means of tuning electron correlation in low-dimensional vanadium oxides: Implications for the design of neuromorphic computing materials, intercalation battery cathodes, and photocatalytic architectures."
Mar. 19, 2019 (**Poster Presentation**).
Texas A&M Student Research Week (College Station, TX, US).
Received Sigma Xi Excellence in STEM Research Award
- (11) **Andrews, J. L.**; Banerjee, S. "Metastability as a means of tuning electron correlation in low-dimensional vanadium oxides."
March 20, 2019 (**Poster Presentation**).
Cotton Medal Symposium (College Station, TX).
- (12) **Andrews, J. L.**; Banerjee, S. "Ternary vanadium oxide bronzes as a palette for imagining metastable cathode materials with improved multivalent-ion storage capacities."
Nov. 25, 2018 (**Poster Presentation**).
Fall Meeting of the Materials Research Society (Boston, MA, US).
Received best poster award nomination (~10 awarded per 500)
- (13) **Andrews, J. L.**; Banerjee, S. "Topochemically-stabilized V₂O₅ polymorphs: Expanding the palette of functional multivalent-ion cathode materials."
Oct. 17, 2018 (**Poster Presentation**).
680th Wilhelm and Else Heraeus Seminar on Materials Development for Automotive Propulsion (Bonn, DE).
Received Best Poster Award
- (14) **Andrews, J. L.**; Banerjee, S. "Future directions and challenges for vanadium: Catalytic H₂ generation and Intercalation cathode materials."
Oct. 9, 2018 (**Oral Presentation, Invited**).
Vanitec Energy Storage Committee Meeting (London, UK).
- (15) **Andrews, J. L.**; Banerjee, S. "Topochemical approaches for tuning the electronic structure of vanadium oxides."
July 23, 2018 (**Poster Presentation**).
Solid State Chemistry Gordon Research Conference (New London, NH, US).
- (16) **Andrews, J. L.**; Davidson, R.; Dennis, R. V.; Banerjee, S. "Light metal particles and oxide cathode materials: Building blocks for additive manufacturing."
Apr. 4, 2018 (**Poster Presentation**).

NASA In-space Manufacturing Printed Electronics Workshop (Huntsville, AL, US).

- (17) **Andrews, J. L.**; De Jesus, L. R.; Banerjee, S. "Vanadium solutions to global energy challenges." Oct. 10, 2017 (**Oral Presentation, Invited**).
Vanitec Energy Storage Committee Meeting (Manchester, UK).
- (18) **Andrews, J. L.**; Parija, A.; De Jesus, L. R.; Banerjee, S. "Structural and electronic transitions of ternary vanadium oxide bronzes: Insights into the design of logic circuitry and strategies for the discovery of novel energy storage materials." Nov. 12, 2016 (**Poster Presentation**).
Southwestern Regional Meeting of the American Chemical Society (Galveston, TX, US).
- (19) **Andrews, J. L.**; Marley, P. M.; Sing, S.; Parija, A.; Abtey, T. A.; Sambandamurthy, G.; Banerjee, S. "Electronic and magnetic phase transitions in ternary vanadium oxide bronzes." May 22, 2015 (**Poster Presentation**).
North American Solid-State Chemistry Conference (Tallahassee, FL, US).
- (20) **Andrews, J. L.**; Suriboot, J. L.; Bergbreiter, D. E.; Bazzi, H. S. Novel procedure for the removal of Ru after ROMP and RCM reactions using PIB-bound isocyanides" Spring 2014 (**Poster Presentation**).
National Meeting of the American Chemical Society (Dallas, TX, US).
- (21) **Andrews, J. L.**; Walsh, L.T.; Williams, O.; Chang, H. B.; McCarron, S.; Chadwick, R.; Fjellstad, E.; Olugbemi, R.; Dufoe, D.; Levy, I. J. "Passing the torch: A second generation of leadership at Gordon College." Spring 2014 (**Poster Presentation**).
National Meeting of the American Chemical Society (New Orleans, LA, US).
- (22) **Andrews, J. L.**; Entwistle, K.; Guiguizian, A.; Stewart, B.D.; Boyd, J. E. "Reawakening the student chapter at Gordon College: A project accomplished!" Spring 2012 (**Poster Presentation**).
National Meeting of the American Chemical Society (San Diego, CA, US).

PATENTS, PROVISIONAL PATENTS, & PATENT APPLICATIONS

- (1) Banerjee, S.; **Andrews, J. L.**; Cho, J.; Watson, D. "Quantum material/vanadium oxide heterostructures, methods of making same, and uses thereof." *Patent Application No. 17/084,746* filed **October 31, 2021**.
- (2) Banerjee, S.; **Andrews, J. L.** "Electrochemical storage incorporating size- and morphology-controlled metastable vanadium pentoxide as a cathode material for ion batteries." *Patent Application No. 16/956,775*, filed **June 22, 2020**. **Licensed to Dimien LLC**
- (3) S. Banerjee, S.; **Andrews, J. L.**; Parija, A. "Electrochemical storage incorporating size- and morphology-controlled metastable vanadium pentoxide as a cathode material for ion batteries." *Patent Application No. 16/956,761*, filed **June 22, 2020**. **Licensed to Dimien LLC**.

AWARDED GRANTS

- (1) **Andrews, J. L.**; Davidson, R. D. "'Marvelous' metal deposition: Real-time tin dendrite fractal growth." Inaugural Kenney-Kennicutt, Hogg, & Peck Activity Educational Demonstration Development Grant. August 21, **2019**. (\$500/yr Educational Development Funds)

SYNERGISTIC ACTIVITIES

- (1) **Industry Liaison:** Served as industry liaison for TAMU collaboration with Intel Corporation from 2014-2016: coordinated group research activities; oversaw monthly communication of project results. Served as industry liaison for TAMU collaboration with Vanitec Corporation from 2015-2019: coordinated group research activities; oversaw quarterly communication of project results; and communicated annual progress reports at Vanitec Meetings.
- (2) **Community Outreach:** Developed an educational outreach demonstration using funds awarded from the inaugural Kenney-Kennicutt, Hogg, & Peck Activity Educational Demonstration Development Grant which was aimed at allowing students to visualize battery degradation in real time. This outreach demonstration was first implemented at the 2019 Texas A&M University (TAMU) National Chemistry Week Open House event (and has been implemented each year since) reaching >500 K-12 students annually. Organized and

fundraised for the annual TAMU Chemistry PLU 5K fun run from 2015-2019, which funded elementary school science classrooms through awards and chemical demonstration supply funds (Awarded PLU Sharon Dabney Excellence in Service and Research). Worked as a Beyond Benign Fellow (outreach arm of the Warner Babcock Institute for Green Chemistry) at Gordon College and participated in >30 green chemistry outreach events for K-12 students from 2010-2014 including demonstration at Quincy High School, the Kipp Academy (Lynn), the La Vida Scholars Program (Lynn), Boston Public Library (Boston, Lynn, Malden, Dorchester), the Boys and Girls Club (Lynn, Dorchester), The Boston Museum of Science, the Boston Children's Museum, Newburyport High School, and others. As treasurer and president of the Gordon College ACS chapter, I organized and implemented the inaugural "Chemistry on the Quad" event, which reached >200 college students, local community members, and their families annually. As president of the Gordon College ACS chapter, I fostered relationships with local after school programs aimed at serving members of underrepresented communities in the Lynn, MA area to provide free after school tutoring in all subject areas – reaching upwards of 15 high school students weekly.

- (3) **Peer Review Referee:** Served as a peer reviewer for *Cell Reports Physical Chemistry* (1), *Journal of the American Chemical Society* (1), *ACS Omega* (1), *Chemistry of Materials* (1), *PCCP* (1), *RSC Advances* (1), and *AAAS* (1) since 2021.

PROFESSIONAL AFFILIATIONS

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|---|----------------------|
| ▪ American Chemical Society | Member, 2010–Present |
| ▪ Materials Research Society | Member, 2016–Present |
| ▪ Sigma Xi, Scientific Research Society | Member, 2013–Present |