

Davi Soares

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EDUCATION

- **Kansas State University (K-State)** Manhattan, Kansas, United States of America
Ph.D. in Mechanical Engineering Jan. 2019 – May 2021
- **Universidade Estadual de Campinas (Unicamp)** Campinas, São Paulo, Brazil
Master of Science in Electrical Engineering Aug. 2017 – Dec. 2018
- **Imperial College Business School** London, United Kingdom
Summer course in Business Strategy and Consulting Jul. 2014 – Ago. 2014
- **Arizona State University (ASU)** Tempe, Arizona, United States of America
Undergraduate scholar Aug. 2012 – May 2013
- **Universidade Federal de Itajubá (Unifei)** Itajubá, Minas Gerais, Brazil
Bachelor of Science in Electrical Engineering Mar. 2010 – Dec. 2015

EXPERIENCE

- **Wichita State University** Wichita, Kansas
Assistant professor August 2023 - present
 - Conducting advanced research on novel materials for beyond lithium-ion batteries and enhanced models for lithium-ion batteries;
 - Teaching graduate course "ECE 777AE - Characterization and Modeling of Batteries" at the Department of Electrical and Computer Engineering.
 - Teaching undergraduate course "ECE 463 - Applied Engineering Electromagnetics" at the Department of Electrical and Computer Engineering.
- **Freudenberg e-Power Systems** Auburn Hills, Michigan
Engineer August 2021 - July 2023
 - Assisted in the development and simulation of electrochemical models of lithium-ion cells and electrodes to better understand physical and electrochemical phenomenon;
 - Acquired, processed, and analyzed experimental data to determine lithium-ion battery electrochemical performance and thermal behavior;
 - Assisted in the development of equivalent circuit models for lithium ion cells and battery packs and use them to simulate in field operation;
 - Modeled power and energy of lithium ion cells cells of different designs and materials.
- **Kansas State University** Manhattan, Kansas
Graduate research assistant January 2019 - July 2021
 - Conducted research on large scale manufacturing of 2D materials, with focus on transition metal dichalcogenides (TMDs), for the development of next generation of batteries sponsored by National Science Foundation (NSF) grant number 1454151;
 - Designed and implemented electrospinning setup for research of high temperature applications of polymer-derived ceramics (PDC) fiber mats in project sponsored by National Science Foundation (NSF) grant number 1743701.
- **Universidade Estadual de Campinas** Campinas, São Paulo, Brazil
Graduate research assistant Aug. 2017 - Dec. 2018
 - Performed the growth of transition metal oxides and carbide thin films, using hot filament chemical vapor deposition (HFCVD), for study as active electrodes for electrochemical capacitors;
 - Performed materials characterization employing techniques such as Raman spectroscopy, cyclic voltammetry, galvanostatic charge-discharge, electrochemical impedance spectroscopy (EIS), among others.
- **JS Insulators Industry** Mogi-Mirim, São Paulo, Brazil
Technical commercial analyst Jan. 2016 - Aug. 2017
 - Developed special projects in order to meet clients' technical requirements;

- Represented the company towards Brazilian Committee of Electricity, Electronics, Lighting and Telecommunication (COBEI).

- **High Voltage Laboratory at Universidade Federal de Itajubá** Itajubá, Minas Gerais, Brazil
Undergraduate student researcher May 2014 - Dec. 2015
 - Performed electromagnetic simulation on composite materials using COMSOL Multiphysics as member of a project entitled: *Optical sensors technology application in smart surge arresters*;
 - Developed part project that evaluated the electric field increase caused by water droplets on dielectric surfaces.
- **General Electric Transportation** Erie, Pennsylvania, United States of America
3P/New Product Introduction intern May 2013 - Aug. 2013
 - Facilitated meetings with engineers, business leaders, material technical advisors and product technical advisors in order to find opportunities to increase productivity by using Production Preparation Process (3P) tools;
 - Developed standard work to aid operators, material technical advisors and product technical advisors in the assembly line, and led sub-project that increased the productivity by of 12% in final assembly.
- **JS Insulators Industry** Mogi-Mirim, São Paulo, Brazil
Production assembly, quality control worker and commercial department assistant Jan. 2006 - Mar. 2009
 - Received raw materials and inspected them for quality control purposes;
 - Operated hydraulic vulcanizing press and performed mechanical routine tests to ensure the final product was acceptable.

GRANTS

- **Kansas NSF EPSCoR:** “*Physics-informed machine learning model for assessment of state of health of lithium-ion batteries used in resilient infrastructure applications*”, \$67,652, PI. Share: 100%.
- **National Institute for Aviation Research (NIAR):** Serving as technical consultant for aerospace industry, approximately \$25,000, PI. Share: 100%.
- **Multidisciplinary Research Projects (MURPA):** “*Mitigating failures in battery-powered flights: battery management through safety-critical control*”, \$7,498, PI. Share: 50%.
- **Tim & Laura Unruh faculty support in engineering fund:** Grant awarded to “*advance the work on understanding the longevity of rechargeable batteries*”, \$1,500, PI. Share: 100%

ORGANIZATIONS

- **Tau Beta Pi - Engineering Honor Society:** Member.
- **IEEE - Eta Kappa Nu:** Member.

HONORS & AWARDS

- **Material advantage graduate student poster competition:** 1st place in the Materials Science & Technology 2020 (MS&T20) poster competition.
- **Alan Levin department of mechanical and nuclear engineering travel grant award:** Grant awarded to take *MXenes Synthesis* and *MXenes Characterization* courses in “*MXenes: Ten Years Later*” Conference.
- **Dr. Pau-Chang Lu graduate scholarship:** Scholarship awarded in Spring 2020 to the student in the Mechanical and Nuclear Engineering department who had minimum cumulative GPA of 3.8, and demonstrated independent study seeking knowledge with self-motivation, worthwhile and innovative research.
- **Naim Z. and Beverly J. Azer mechanical engineering graduate scholarship:** Scholarship awarded in Spring 2020.
- **American Ceramic Society (ACerS) travel grant award:** Grant awarded by *Engineering Ceramics Division* (ECD) for student speaker at 44th *International Conference and Expo on Advanced Ceramics and Composites* (ICACC 2020) in Daytona Beach, FL.
- **Alan Levin Department of Mechanical and Nuclear Engineering travel grant award:** Grant awarded to 44th *International Conference and Expo on Advanced Ceramics and Composites* (ICACC 2020) in Daytona Beach, FL.
- **São Paulo Research Foundation (FAPESP) scholarship:** Scholarship awarded under FAPESP process 2014/02163-7 to attend the “Brazilian Synchrotron School: Fundamentals and Applications”, held at Brazilian Synchrotron Light Laboratory (LNLS) in Brazilian Center for Research in Energy and Materials (CNPEM).

- **Japan Student Services Organization (JASSO) scholarship:** Scholarship sponsored by Japanese government to pursue studies at Tokyo University of Agriculture and Technology (TUAT) as part of the *Co-creative education program of humanities and sciences to solve global issues confronting Japan and Latin America (La-CEP) program*.
- **Master of science scholarship:** Scholarship of approximately USD 12,000.00 sponsored by *Coordination for the Improvement of Higher Education Personnel*; ranked first in the selection process for Master of Science scholarship at School of Electrical and Computer Engineering (FEEC) at University of Campinas (Unicamp).
- **Young talent attraction scholarship:** Scholarship of approximately USD 1,500.00 sponsored by *Coordination for the Improvement of Higher Education Personnel* at High Voltage Laboratory at Federal University of Itajubá (Unifei).
- **Science without borders scholarship:** Full scholarship of USD 50,000.00 sponsored by *Institute of International Education and Coordination for the Improvement of Higher Education Personnel* to pursue studies at Arizona State University (ASU).
- **Medal of Honor:** Awarded the Medal of Honor by Brazilian Army due to discipline during Military Service.

PUBLICATIONS

- [1] C. R. de Almeida, P. Jackson, R. Vicentini, **E. L. Pereira**, E. Santos, L. M. da Silva, D. M. Soares, and H. Zanin, "Charge and energy storage properties of nio-ac composites in organic electrolyte using operando raman and distributed capacitance analyses in the time domain," *Journal of Energy Storage*, under review, 2024.
- [2] M. Alexandreli, C. B. Brocchi, D. M. Soares, W. G. Nunes, B. G. Freitas, F. E. de Oliveira, L. E. C. A. Schiavo, A. C. Peterlevitz, L. M. da Silva, and H. Zanin, "Pseudocapacitive behaviour of iron oxides supported on carbon nanofibers as a composite electrode material for aqueous-based supercapacitors," *Journal of Energy Storage*, vol. 42, p. 103052, 2021.
- [3] B. Freitas, W. G. Nunes, D. M. Soares, F. C. Rufino, C. M. Moreira, L. M. Da Silva, and H. Zanin, "Robust, flexible, freestanding and high surface area activated carbon and multi-walled carbon nanotubes composite material with outstanding electrode properties for aqueous-based supercapacitors," *Materials Advances*, vol. 2, pp. 4264–4276, 2021.
- [4] D. M. Soares, Z. Ren, S. B. Mujib, S. Mukherjee, C. G. Martins Real, M. Anstine, H. Zanin, and G. Singh, "Additive manufacturing of electrochemical energy storage systems electrodes," *Advanced Energy and Sustainability Research*, vol. 2, no. 5, p. 2000111, 2021.
- [5] S. B. Mujib, Z. Ren, S. Mukherjee, D. M. Soares, and G. Singh, "Design, characterization, and application of elemental 2D materials for electrochemical energy storage, sensing, and catalysis," *Materials Advances*, vol. 1, pp. 2562–2591, 2020.
- [6] D. M. Soares and G. Singh, "Superior electrochemical performance of layered WTe₂ as potassium-ion battery electrode," *Nanotechnology*, vol. 31, p. 455406, aug 2020.
- [7] D. M. Soares, S. Mukherjee, and G. Singh, "TMDs beyond MoS₂ for electrochemical energy storage," *Chemistry – A European Journal*, vol. 26, no. 29, pp. 6320–6341, 2020.
- [8] D. M. Soares and G. Singh, "SiOC functionalization of MoS₂ as a means to improve stability as sodium-ion battery anode," *Nanotechnology*, vol. 31, p. 145403, jan 2020.
- [9] D. M. Soares, R. Vicentini, A. C. Peterlevitz, C. B. Rodella, L. M. da Silva, and H. Zanin, "Tungsten oxide and carbide composite synthesized by hot filament chemical deposition as electrodes in aqueous-based electrochemical capacitors," *Journal of Energy Storage*, vol. 26, p. 100905, 2019.
- [10] S. Mukherjee, J. Turnley, E. Mansfield, J. Holm, D. Soares, L. David, and G. Singh, "Exfoliated transition metal dichalcogenide nanosheets for supercapacitor and sodium ion battery applications," *Royal Society Open Science*, vol. 6, no. 8, p. 190437, 2019.
- [11] R. Vicentini, W. Nunes, B. G. Freitas, L. M. D. Silva, D. M. Soares, R. Cezar, C. B. Rodella, and H. Zanin, "Niobium pentoxide nanoparticles @ multi-walled carbon nanotubes and activated carbon composite material as electrodes for electrochemical capacitors," *Energy Storage Materials*, vol. 22, pp. 311 – 322, 2019.

- [12] R. Vicentini, D. M. Soares, W. Nunes, B. Freitas, L. Costa, L. M. D. Silva, and H. Zanin, "Core-niobium pentoxide carbon-shell nanoparticles decorating multiwalled carbon nanotubes as electrode for electrochemical capacitors," *Journal of Power Sources*, vol. 434, p. 226737, 2019.
- [13] S. Mukherjee, S. Bin Mujib, D. Soares, and G. Singh, "Electrode materials for high-performance sodium-ion batteries," *Materials*, vol. 12, no. 12, 2019.
- [14] R. Vicentini, L. H. Costa, W. Nunes, O. Vilas Boas, D. M. Soares, T. A. Alves, C. Real, C. Bueno, A. C. Peterlevitz, and H. Zanin, "Direct growth of mesoporous carbon on aluminum foil for supercapacitors devices," *Journal of Materials Science: Materials in Electronics*, vol. 29, pp. 10573–10582, Jun 2018.
- [15] D. M. Soares, S. Mendonça, E. T. Neto, and M. L. Martinez, "Electrical field on non-ceramic insulators and its relation to contact angles for constant volume droplets," *Journal of Electrostatics*, vol. 84, pp. 97 – 105, 2016.
- [16] I. F. S. dos Santos, N. D. B. Vieira, R. M. Barros, G. L. T. Filho, D. M. Soares, and L. V. Alves, "Economic and CO₂ avoided emissions analysis of WWTP biogas recovery and its use in a small power plant in Brazil," *Sustainable Energy Technologies and Assessments*, vol. 17, pp. 77 – 84, 2016.

CONFERENCE PROCEEDINGS (PEER REVIEWED)

- [1] **D. Ogun** and D. M. Soares, "Electric field analysis at triple-joints and localized defects on different composite insulators designs," in *2024 IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP)*, p. *in press*, IEEE, 2024.

INVITED BOOK CHAPTERS

- [1] D. M. Soares, S. Mukherjee, and G. Singh, "Transition metal dichalcogenides as active anode materials for sodium-ion batteries, handbook of sodium-ion batteries: Materials and characterisation," Jenny Stanford Publishing, 2023.
- [2] S. B. Mujib, S. Mukherjee, Z. Ren, D. M. Soares, C. G. M. Real, H. Zanin, and G. Singh, "Recent advances and trends in al-ion batteries," *Advanced Technologies for Rechargeable Batteries*, pp. 55–76.

CONFERENCE/WORKSHOP PRESENTATIONS

- [1] **E. Pereira**, **D. Ogun**, and D. M. Soares, "Online state of health assessment of lithium-ion battery using physics-informed machine learning model for resilient infrastructure applications," ASME International Mechanical Engineering Congress and Exposition (IMECE 2024), November 2024.
- [2] D. M. Soares and G. Singh, "A comparative study of tantalum disulfide as lithium-ion and potassium-ion batteries," MS&T 2021, October 2021.
- [3] D. M. Soares and G. Singh, "Tungsten ditelluride, a semimetal transition metal dichalcogenide as active material for monovalent-ion battery electrodes," MS&T 2021, October 2021.
- [4] D. M. Soares and G. Singh, "Layered Te-based transition metal dichalcogenides as stable beyond lithium-ion battery electrodes," XIX Brazilian Materials Research Society Meeting (XIX B-MRS), August 2021.
- [5] D. M. Soares and G. Singh, "Unveiling electrochemical performance of tantalum disulfide (TaS₂) as beyond lithium-ion battery anode material," XIX Brazilian Materials Research Society Meeting (XIX B-MRS), August 2021.
- [6] D. M. Soares and G. Singh, "Electrochemical studies of TaS₂ as electrode material for monovalent-ion batteries," MRS Spring 2021, April 2021.
- [7] D. M. Soares and G. Singh, "Layered tungsten-based dichalcogenides as potassium-ion battery electrodes," 45th International Conference and Expo on Advanced Ceramics and Composites (ICACC 2021), February 2021.

- [8] D. M. Soares and G. Singh, "Polymer-derived ceramics functionalization of molybdenum disulfide towards electrochemical stability of sodium-ion battery electrode," 45th International Conference and Expo on Advanced Ceramics and Composites (ICACC 2021), February 2021.
- [9] D. M. Soares and G. Singh, "WTe₂, a semimetal transition metal dichalcogenide electrode for potassium-ion batteries," 2020 Materials Research Society (MRS) Spring/Fall Meeting & Exhibit, November 2020.
- [10] D. M. Soares, C. Shuck, N. Kurra, Y. Gogotsi, and G. Singh, "MXene nanosheets as active materials for nonaqueous monovalent-ion battery electrodes," 2020 Materials Research Society (MRS) Spring/Fall Meeting & Exhibit, November 2020.
- [11] D. M. Soares, C. Shuck, N. Kurra, Y. Gogotsi, and G. Singh, "Mo₂TiC₂ and Mo₂Ti₂C₃ Mxene nanosheets as electrode materials for sodium- and potassium-ion batteries," ASME International Mechanical Engineering Congress and Exposition (IMECE 2019), November 2020.
- [12] D. M. Soares and G. Singh, "Silicon carbon nitride (SiCN) and silicon oxycarbide (SiOC) functionalization of molybdenum disulfide (MoS₂) as stable battery electrodes," Materials Science & Technology 2020 (MS&T20), November 2020.
- [13] D. M. Soares, C. Shuck, N. Kurra, S. Justus, P. Herold, M. Ellis, Y. Gogotsi, and G. Singh, "MXene nanosheets as lithium, sodium-, and potassium-ion batteries: a fundamental study," American Chemical Society (ACS) Fall 2020 Virtual Meeting & Exposition, August 2020.
- [14] D. Soares, S. Justus, P. Herold, M. Ellis, and G. Singh, "Polymer-derived ceramics functionalization of sulphur-based TMD for electrochemical stability of sodium-ion battery anode," American Chemical Society (ACS) Fall 2020 Virtual Meeting & Exposition, August 2020.
- [15] D. M. Soares, C. Shuck, N. Kurra, Y. Gogotsi, and G. Singh, "MXene nanosheets as alkali metal-ion battery electrodes: Initial studies," MXenes: Ten Years Later Conference, August 2020.
- [16] D. Marcelo and G. Singh, "Two dimensional nanomaterials functionalized by polymer-derived ceramic as stable battery electrodes," 44th International Conference and Expo on Advanced Ceramics and Composites (ICACC 2020), January 2020.
- [17] D. M. Soares, R. Vicentini, G. Singh, A. C. Peterlevitz, and H. Zanin, "Tungsten oxide and carbide composite electrodes for electrochemical capacitors synthesized by hot filament vapor deposition technique," 44th International Conference and Expo on Advanced Ceramics and Composites (ICACC 2020), January 2020.
- [18] D. Soares, R. Vicentini, H. Zanin, and G. Singh, "Core/shell Nb₂O₅ nanoparticles/carbon on carbon nanotubes as symmetrical supercapacitor electrodes," ASME International Mechanical Engineering Congress and Exposition (IMECE 2019), November 2019.
- [19] D. Soares and G. Singh, "Electrochemical performance of polymer-derived ceramic functionalized transition metal dichalcogenides," ASME International Mechanical Engineering Congress and Exposition (IMECE 2019), November 2019.
- [20] S. Bin-Mujib, S. Mukherjee, D. Arreola, D. M. Soares, and G. Singh, "Assessing corrosion resistance of 2D nanomaterial-based coatings on stainless steel substrates," ASME International Mechanical Engineering Congress and Exposition (IMECE 2019), November 2019.
- [21] D. Soares and G. Singh, "Electrochemical behavior of polymer-derived ceramic functionalized transition metal dichalcogenides (TMD)," 13rd Pacific Rim Conference of Ceramic Societies (PACRIM13), October 2019.
- [22] D. Soares and G. Singh, "Electrochemical behavior of functionalized transition metal dichalcogenide nanosheets," American Chemical Society (ACS) Fall 2019 National Meeting & Exposition, August 2019.

- [23] D. Soares, R. Vicentini, H. Zanin, and G. Singh, “Core/shell Nb₂O₅ nanoparticles/carbon on carbon nanotubes as symmetrical supercapacitor electrodes,” National Science Foundation (NSF) Partnerships for International Research and Education (PIRE) Workshop, July 2019.
- [24] C. G. M. Real, R. Vicentini, W. G. Nunes, O. V. Boas, T. A. Alves, D. M. Soares, and H. Zanin, “Polyacrylonitrile and activated carbon composite for electric double layer capacitors,” in *SAE Technical Paper*, SAE International, September 2018.
- [25] C. G. M. Real, R. Vicentini, W. G. Nunes, O. V. Boas, L. H. Costa, D. M. Soares, and H. Zanin, “Electric double layer capacitors prepared with polyvinyl alcohol and multi-walled carbon nanotubes,” in *SAE Technical Paper*, SAE International, September 2018.

TEACHING

				Student evaluation (Scale 1-5, 5 = Outstanding)	
Course	Level	Year	Enrollment	Course evaluation:	Instructor evaluation:
ECE 463: Applied engineering electromagnetics	Junior	Fall 2023	22	4.10 (WSU mean: 4.20)	4.36 (WSU mean: 4.23)
ECE 777AE: Characterization and modeling of batteries	Grad. / Senior elective	Spring 2024	7	4.57 (WSU mean: 4.22)	4.52 (WSU mean: 4.25)

VOLUNTEER EXPERIENCE

- **American Cancer Society** Erie, Pennsylvania, United States of America
Relay for life fundraiser. Jul. 2013 - Ago. 2013
- **General Electric Transportation** Erie, Pennsylvania, United States of America
Produced hundreds of blankets for newborn children in Latin America. Jul. 2013 - Ago. 2013
- **San Marcos Elementary School** Chandler, Arizona, United States of America
Presented a talk to the students about STEM field and our society. Oct. 2012 - Oct. 2012
- **AIESEC Itajubá** Itajubá, Minas Gerais – Brazil
Trainee nomination manager & incoming exchange coordinator. Mar. 2009 - Dec. 2010
- **Polivalente Elementary School** Itajubá, Minas Gerais, Brazil
Volunteer mathematics teacher. Mar. 2009 - Ago. 2009