Davi Soares

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Education

- **Kansas State University** — Manhattan, Kansas, USA
  Ph.D. in Mechanical Engineering — *January 2019 – August 2021*
- **University of Campinas** — Campinas, Sao Paulo, Brazil
  Master of Science in Electrical Engineering — *August 2017 – December 2018*
- **Federal University of Itajuba** — Itajuba, Minas Gerais, Brazil
  Bachelor of Science in Electrical Engineering — *March 2010 – December 2015*

Non-degree academic experience

- **Imperial College London Business School** — London, United Kingdom
  Summer course in Business Strategy and Consulting — *July 2014 – August 2014*
- **Arizona State University** — Tempe, Arizona, United States of America
  Visiting undergraduate scholar — *August 2012 – April 2013*

Professional experience

- **Wichita State University** — Wichita, Kansas, USA
  Tenure-track assistant professor and principal investigator of the Energy systems lab. — *August 2023 - present*
- **Freudenberg e-Power Systems** — Auburn Hills, Michigan, USA
  Cell modeling engineer — *August 2021 - July 2023*
- **Kansas State University** — Manhattan, Kansas, USA
  Graduate research assistant — *January 2019 - July 2021*
- **State University of Campinas** — Campinas, São Paulo, Brazil
  Graduate research assistant — *August 2017 - December 2018*
- **JS Insulators Industry** — Mogi-Mirim, São Paulo, Brazil
  Technical commercial analyst — *January 2016 - August 2017*
- **High Voltage Laboratory at Federal University of Itajuba** — Itajuba, Minas Gerais, Brazil
  Undergraduate student researcher — *May 2014 - December 2015*
- **General Electric Transportation** — Erie, Pennsylvania, USA
  3P/New Product Introduction intern — *May 2013 - August 2013*

Honors & Awards

- **University of Campinas (UNICAMP) Electrical Engineering outstanding alumni award:** 2025.
- **Wichita State University young faculty risk-taker award:** 2025.
- **Kansas NSF EPSCoR First Award:** 2023-2025.
- **Dr. Pau-Chang Lu graduate scholarship:** 2020.
- **Naim Z. and Beverly J. Azer Mechanical Engineering graduate scholarship:** 2020.
- ***Japan Student Services Organization (JASSO)* scholarship:** Sponsored by the Japanese government, 2018.
- **Master of science scholarship:** Sponsored by *Coordination for the Improvement of Higher Education Personnel*, 2017-2018.
- ***Young talent attraction* scholarship:** Sponsored by the *Coordination for the Improvement of Higher Education Personnel*, 2014.
- ***Science without borders* scholarship:** Sponsored by *Institute of International Education*, 2012.
- **Medal of Honor:** Awarded the Medal of Honor by Brazilian Army due to discipline during military service, 2008.

Publications (bold font indicates a student author)

Peer-reviewed journal articles

[1] **M. Z. Hossain** and D. M. Soares, "Electrochemical activity of $NbSe_2$ in sodium and potassium-ion batteries: a temperature-dependent study," *Future Batteries*, p. 100131, 2025.

[2] G. M. Lustosa, W. A. Bizzo, L. V. de Souza, G. Biasotto, L. A. Perazolli, K. C. Pereira, C. C. Silva, D. M. Soares, and T. Mazon, "Boosting properties of the biochar composite by an in situ growth of nickel nanospheres through an one-step synthesis: applications in supercapacitors," *Materials Research Bulletin*, p. 113885, 2025.

[3] C. 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," *Next Energy*, vol. 9, p. 100461, 2025.

[4] **E. L. Pereira**, **D. Ogun**, and D. M. Soares, "Comprehensive real-time insights for state of health prediction: A comprehensive framework for online state of health assessment in commercial lithium-ion batteries," *ChemElectroChem*, p. 2400708, 2025.

[5] D. M. Soares and G. Singh, "Weyl semimetal orthorhombic Td-WTe_2 as an electrode material for sodium- and potassium-ion batteries," *Nanotechnology*, vol. 32, p. 505402, sep 2021.

[6] 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.

[7] 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.

[8] 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.

[9] 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.

[10] D. M. Soares and G. Singh, "Superior electrochemical performance of layered WTe_2 as potassium-ion battery electrode," *Nanotechnology*, vol. 31, p. 455406, aug 2020.

[11] D. M. Soares, S. Mukherjee, and G. Singh, "TMDs beyond MoS_2 for electrochemical energy storage," *Chemistry – A European Journal*, vol. 26, no. 29, pp. 6320–6341, 2020.

[12] D. M. Soares and G. Singh, "SiOC functionalization of MoS_2 as a means to improve stability as sodium-ion battery anode," *Nanotechnology*, vol. 31, p. 145403, jan 2020.

[13] 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.

[14] 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.

[15] 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.

[16] 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.

[17] S. Mukherjee, S. Bin Mujib, D. Soares, and G. Singh, "Electrode materials for high-performance sodium-ion batteries," *Materials*, vol. 12, no. 12, 2019.

[18] 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.

[19] 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.

[20] 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 CO_2 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.

Peer-reviewed conference proceedings

[1] N. Aravinthan, M. Koester, D. Alexander, M. Peterson, and D. Soares, "Enhancing hybrid battery-solar return on investment by dynamic battery pack usage and charge management," in *2025 57th North American Power Symposium (NAPS)*, pp. 1–6, 2025.

[2] **E. L. Pereira**, **M. Z. Hossain**, **D. Ogun**, and D. Soares, "Machine learning-based framework for online state of health assessment and end-of-life prediction in commercial lithium-ion batteries," in *2025 IEEE Green Technologies Conference (GreenTech)*, pp. 108–112, 2025.

[3] **D. Ogun** and D. 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)*, pp. 1–4, 2024.

Peer-reviewed book chapters

[1] 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*. CRC Press, 2024.

[2] 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.

Conference presentations

[1] **M. Zawad Hossain** and D. M. Soares, "Exploration of temperature variability effect on electrochemical performance of $NbSe_2$ electrode in sodium-ion batteries," 247^{th} ECS Meeting, May 2025.

[2] **M. Zawad Hossain** and D. M. Soares, "Temperature effect on electrochemical performance of $NbSe_2$ electrode in sodium-ion batteries," ACS Spring 2025, March 2025.

[3] **E. Pereira**, **D. Ogun**, and D. M. Soares, "A physics-informed machine learning framework for state-of-health assessment of lithium-ion batteries in resilient infrastructure applications," Kansas Capitol Graduate Research Summit, March 2025.

[4] **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.

[5] D. M. Soares and G. Singh, "A comparative study of tantalum disulfide as lithium-ion and potassium-ion batteries," MS&T 2021, October 2021.

[6] 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.

[7] 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.

[8] D. M. Soares and G. Singh, "Unveiling electrochemical performance of tantalum disulfide (TaS_2) as beyond lithium-ion battery anode material," XIX Brazilian Materials Research Society Meeting (XIX B-MRS), August 2021.

[9] D. M. Soares and G. Singh, "Electrochemical studies of TaS_2 as electrode material for monovalent-ion batteries," MRS Spring 2021, April 2021.

[10] D. M. Soares and G. Singh, "Layered tungsten-based dichalcogenides as potassium-ion battery electrodes," 45^{th} International Conference and Expo on Advanced Ceramics and Composites (ICACC 2021), February 2021.

[11] D. M. Soares and G. Singh, "Polymer-derived ceramics functionalization of molybdenum disulfide towards electrochemical stability of sodium-ion battery electrode," 45^{th} International Conference and Expo on Advanced Ceramics and Composites (ICACC 2021), February 2021.

[12] D. M. Soares and G. Singh, "WTe_2, a semimetal transition metal dichalcogenide electrode for potassium-ion batteries," 2020 Materials Research Society (MRS) Spring/Fall Meeting & Exhibit, November 2020.

[13] 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.

[14] D. M. Soares, C. Shuck, N. Kurra, Y. Gogotsi, and G. Singh, "Mo_2TiC_2 and $Mo_2Ti_2C_3$ Mxene nanosheets as electrode materials for sodium- and potassium-ion batteries," ASME International Mechanical Engineering Congress and Exposition (IMECE 2019), November 2020.

[15] D. M. Soares and G. Singh, "Silicon carbon nitride (SiCN) and silicon oxycarbide (SiOC) functionalization of molybdenum disulfide (MoS_2) as stable battery electrodes," Materials Science & Technology 2020 (MS&T20), November 2020.

[16] 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.

[17] 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.

[18] 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.

[19] D. Marcelo and G. Singh, "Two dimensional nanomaterials functionalized by polymer-derived ceramic as stable battery electrodes," 44^{th} International Conference and Expo on Advanced Ceramics and Composites (ICACC 2020), January 2020.

[20] S. B. Mujib, S. Mukherjee, D. M. Soares, Z. Ren, and G. Singh, "Corrosion resistance of 2D nanomaterial-based coatings on stainless steel substrates," 44th International Conference and Expo on Advanced Ceramics and Composites (ICACC 2020), January 2020.

[21] 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.

[22] D. Soares, R. Vicentini, H. Zanin, and G. Singh, "Core/shell Nb_2O_5 nanoparticles/carbon on carbon nanotubes as symmetrical supercapacitor electrodes," ASME International Mechanical Engineering Congress and Exposition (IMECE 2019), November 2019.

[23] 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.

[24] 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.

[25] 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.

[26] D. Soares and G. Singh, "Electrochemical behavior of functionalized transition metal dichalcogenide nanosheets," American Chemical Society (ACS) Fall 2019 National Meeting & Exposition, August 2019.

[27] D. Soares, R. Vicentini, H. Zanin, and G. Singh, "Core/shell Nb_2O_5 nanoparticles/carbon on carbon nanotubes as symmetrical supercapacitor electrodes," National Science Foundation (NSF) Partnerships for International Research and Education (PIRE) Workshop, July 2019.

[28] 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.

[29] 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.

Invited presentations

[1] D. Soares, "Enhanced state of health assessment of lithium-ion batteries for resilient infrastructure systems," p. Adaptive & Resilient Infrastructures driven by Social Equity (ARISE) Webinar Series, December, 2025.

[2] D. Soares, "Lithium-ion batteries and beyond: a comprehensive perspective on state of health assessment," pp. 2025 IEEE Green Technologies Conference, Wichita, KS, March, 2025.

[3] D. Soares, "Lithium-ion batteries and beyond: an approach from novel materials and modeling technologies," pp. Universidad Autonoma de Occidente, Cali – Colombia, September, 2024.

Teaching

- **Educational activity:**

1. Developed a new graduate level course in Battery modeling and characterization (course number ECE 777AE: Characterization and modeling of batteries).

2. Assisted in the development of ECE 777AF: Controls, Communication and Storage for Transportation Electrification for continuing education programs.

Course	Level	Year	Enrollment	Student evaluation (Scale 1-5, 5 = Outstanding) Course evaluation:	Instructor evaluation:
ECE 463: Applied engineering electromagnetics	Junior	Fall 2023	22	4.10	4.36
		Fall 2024	42	4.08	4.31
		Fall 2025	35	4.33	4.50
ECE 777AE: Characterization and modeling of batteries	Grad. / senior elective	Spring 2024	7	4.57	4.52
		Spring 2025	18	4.31	4.43

Service

College of Engineering service:

- **Collaborations with industry:** organized site visit for Panasonic Energy on campus, which included lab tours, meetings with faculty to discuss opportunities, and an information session for students about career opportunities (Fall 2025).

Department service:

- **Electrical and Computer Engineering graduate committee member:** (Fall 2023 – present).
- **Electrical and Computer Engineering faculty advisor:** (Fall 2023 – present).
- **Electrical and Computer Engineering senior design faculty advisor:** (Fall 2023 – Spring 2025).

Professional activities

- **Proposal reviewer and panelist for:** National Science Foundation (NSF) - CBET Electrochemical Systems, Department of Energy (DOE) ARPA-E.
- **Scientific editor (handling editor with independent decision authority):** Materials Today Communications (impact factor: 4.5) (Fall 2025 - present).
- **Member of:** IEEE - Eta Kappa Nu, Tau Beta Pi, and Materials Research Society (MRS).
- **Journal article reviewer:**

Nature Nanotechnology	Advanced Materials Technologies
Nanoscale	Journal of Materials Chemistry A
Small Methods	Crystals
IOP Nanotechnology	Energies
Nano-Micro Letters	Molecules
RSC Advances	Scientific Reports
Journal of Alloys and Compounds	Physica E: Low-dimensional Systems and Nanostructures

Students supervised

- **Ph.D. advisees:**

1. Eric L. Pereira (Spring 2024 - Spring 2027 (*expected*)). Conducting research on enhanced physics-informed machine learning models for resilient battery-powered infrastructure systems. **Awards:** (i) 2025 Outstanding Graduate Research award; (ii) second place award for Outstanding Research Poster at the NSF 2025 track-1 Adaptive & Resilient Infrastructures driven by Social Equity (ARISE) annual symposium in Garden City, KS; (iii) one of the ten graduate students from the entire university selected to present his research at the Capitol Graduate Research Summit (CGRS) in Topeka, KS.
2. Md Zawad Hossain (Summer 2024 - Fall 2027 (*expected*)). Conducting research on kinetics behavior and its implications on degradation mechanisms of selenide-based transition metal dichalcogenides for nonaqueous monovalent-ion battery technologies. **Awards:** (i) Dora Wallace Hodgson - Outstanding Doctoral Student award; (ii) one of the ten graduate students from the entire university selected to present his research at the Capitol Graduate Research Summit (CGRS) in Topeka, KS.

- **M.S. advisees:**

1. Kolade Oke (Summer 2024). "Mitigating Failures in Battery-powered Flights: Battery Management Through Safety-critical Control".

- **Undergraduate research supervised:**

1. Madison Koester (Fall 2025 - present). "A novel state of health model for lithium metal batteries". Co-author of manuscript accepted at 57^{th} North American Power Symposium (NAPS).
2. Nithish Aravinthan (Fall 2025 - present). "A novel state of health model for lithium metal batteries". First author of manuscript accepted at 57^{th} North American Power Symposium (NAPS).
3. Preston Dihn (Fall 2025 - present). "Advancing the Detection of Lithium-Ion Battery Chemistries for Recycling and Second-Life Applications". First author of a manuscript accepted at 18^{th} Annual IEEE Green Technologies (GreenTech) conference.
4. Antonio Graciano (Fall 2024 - present). "Characterization of electric field enhancement due to gaseous voids in high-Voltage insulators". Awarded 3^{rd} place at the Annual IEEE Wichita Holiday Banquet – IEEE Wichita section (region 5) – poster competition.
5. Leland Seiwert (Spring 2025 - Summer 2025). "Sustainable development of freestanding low-cost potassium-ion supercapacitor electrodes for high energy density and performance".
6. Damilola Ogun (Fall 2023 - Spring 2025). "Cloud-connected battery management: leveraging Raspberry pi for real-time state of health monitoring and analysis".

- **Committee member:**

1. Guto Garcia Santos (M.S., University of Campinas, Brazil). "Development of cathode $Na_3V_2(PO_4)_3$ and electrochemical analysis applied to sodium-ion batteries". July 2025.
2. Raissa Venâncio (Ph.D., University of Campinas, Brazil). "Advanced Electrolytes for High-Voltage Supercapacitors: An Integrated Electrochemical-Operando Approach". July 2025.
3. Sonu Gangadhar Gowda (M.S. project, Asaduzzaman). "Predicting performance of heterogenerous edge-cloud systems using machine learning models". April 2025.
4. Rama Krishna Nallapuri (M.S. project, Aravinthan). "Performance Evaluation and Energy Analysis of a Hybrid Solar-Fuel cell Source Converter for DC Microgrid Integration". December 2024.
5. Vanderleia de Deus Mateus (M.S., University of Campinas, Brazil). August 2024.
6. Syra Kelly Mubarac Silva Oliveira (M.S., University of Campinas, Brazil). August 2024.
7. Kolade Oke (M.S., Pang). "Artificial intelligence-based distance relay behaviors for future power systems with 100% clean electricity". July, 2024.
8. Rafael Felipe Vicentini (Ph.D., University of Campinas, Brazil). "Raman operando investigation on electrochemical double-layer capacitors". September 2023.

Funding

- **Kansas NASA EPSCoR:** Project titled "Investigation of ceramic anodes and ionic liquids to enhance thermal stability and energy density in lithium-ion batteries for aerospace systems", $28,950, P.I. share: 100%.
- **National Institute for Aviation Research (NIAR):** Technical consultancy for a battery-powered aircraft project, $6,330,581, P.I. share: 0.4%.
- **Kansas NSF EPSCoR:** Project titled "Physics-informed machine learning model for assessment of state of health of lithium-ion batteries used in resilient infrastructure applications", $67,652, P.I. share: 100%.
- **Multidisciplinary Research Projects (MURPA):** Project titled "Mitigating failures in battery-powered flights: battery management through safety-critical control", $7,498, PIs 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, P.I. share: 100%.