CURRICULUM VITAE

PERSONAL INFORMATION

Wendi Guo

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EDUCATION BACKGROUND

- Postdoc Fellow, Department of Chemistry, Uppsala University — Dec. 2024 ~ Now
  - Supervisor: Prof. Daniel Brandell
  - Project: Vehicle battery storage for green transport and grid stability in the Nordics
- PhD, AAU Energy, Aalborg University — Dec. 2021 ~ Oct. 2024
  - Supervisor: Associate Prof. Daniel-Ioan Stroe
  - Co-Supervisor: Assistant Prof. Søren Byg Vilsen
  - Project: Physics-informed machine learning for lithium-ion batteries degradation prediction
- Master, School of Reliability and Systems Engineering, BUAA — Sep. 2018 ~ Jan. 2021
  - Supervisor: Prof. Guicui Fu
  - GPA: 3.59/4, RANK: 2/71
  - Project: Study on the reliability of bonding layer for pressureless sintered micron silver paste in extreme temperature environment
- Bachelor, School of Reliability and Systems Engineering, BUAA — Sep. 2014 ~ Jun. 2018
  - Supervisor: Prof. Guicui Fu
  - GPA: 3.635/4, RANK: 1/29
  - Project: Research on thermal reliability evaluation methodology of power devices based on physics of failure

SKILLS

Technical Skills:

Expert in digital twin, machine learning, statistical analysis, and material reconstruction

Solid knowledge of designing accelerated lifetime tests, establishing life prediction models, and Multiphysics simulation

Computer:

Proficient in Python, COMSOL Multiphysics, ANSYS Workbench, MATLAB, Origin, Visio, and MS Office

Familiar with ANSYS Mechanical APDL, Calce PWA

Personal Hobbies: Video making (influencer with 2000+ followers), Photography, Playing piano, Painting, Playing, table tennis, and badminton

PUBLICATIONS

- W. Guo. (2024). Physics Informed Machine Learning for Predicting the Degradation Behavior of Lithium-ion Batteries. https://doi.org/10.54337/aau755548824. **Application Report**
- M. Rahimo, I. Nistor, P. Lanctot, S. Idaka, H. Kondo, G. Majumdar, A. Miyoshi, D. Trifunovich, H. Akagi, F. Blaabjerg, **W. Guo**, et. al, Power semiconductors for an energy-wise society, (2023). **White Paper Book**
- **W. Guo**, SB Vilsen, DI Stroe, D. Brandell., Physics-informed neural network for lithium-ion battery capacity loss based on digital twin, in preparation for *Joule*. **IF 38.6**
- **W. Guo**, SB Vilsen, Y. Li, DI Stroe, D. Brandell., Leveraging digital twin underlying physical parameters to enhance battery health status prediction across multiple fast charging protocols, in preparation for *ACS Energy Letters*. **IF 19.5**
- **W. Guo**, Z. Sun, Y. Li, J. Guo, SB Vilsen, DI Stroe., Digital twin-assisted aging effects and degradation diagnosis of fast charging on NMC battery, *Advanced Energy Materials*. **IF 27.8**
- Y. Li**, W. Guo***, D.-I. Stroe, H. Zhao, P. Kristensen, L. Jensen, K. Pedersen, L. Gurevich., Transition of Aging Mechanisms in Lithium-ion Batteries: A Comparative Study of Performance Degradation under Moderate and Severe Capacity Loss Scenarios, reviewed in *Energy Storage Materials*. **IF 20.4**
- Z. Sun, **W. Guo***, M. Takahashi., S. Munk-Nielsen, A.B. Jørgensen., Thermal Cycling Characterization of an Integrated 650V GaN eHEMT Power Module with a Low-inductance Packaging Technology, reviewed in *IEEE Transactions on Power Electronics*. **IF 6.7**
- Z. Sun, **W. Guo***, A.B. Jørgensen., A computational multiscale modeling method for nano-silver sintered joints with stochastically distributed voids, accepted in *Journal of Electronic Materials*. **IF 2.1**
- **W. Guo**, Y. Li, Z. Sun, SB Vilsen, DI Stroe., A digital twin model to quantitatively understand aging mechanism coupled effects on the anode of NMC battery using three charging protocols, *Energy Storage Materials*. **IF 20.4**
- **W. Guo**, Z. Sun, SB Vilsen, Frede Blaabjerg., DI Stroe., Identification of mechanism consistency for LFP batteries during accelerated aging tests based on statistical distributions, *E-prime-advances in Electrical Engineering, Electronics and Energy*, vol. 4, no. February 2023.
- **W. Guo**, Z. Sun, SB Vilsen, DI Stroe., Review of "grey box" lifetime modeling for lithium-ion battery: combining physics and data-driven methods. *Journal of Energy Storage*. 2022; Vol. 56, No. Part A. **IF 9.4**
- **W. Guo**, G. Fu, B. Wan, M. Zhu, Reconstruction of pressureless sintered micron silver joints and simulation analysis of elasticity degradation in deep space environment, *Applied Sciences*, 2020, 10, 6368. **IF 2.7**
- **W. Guo**, G. Fu, B. Wan, M. Jiang, Y. Li, Storage PoF model of electromagnetic relays based on electrical contact theory, *Microelectronics Reliability*, 100–101 (2019) 113381. **IF 1.6**
- G. Fu, Y. Su, **W. Guo**, B. Wan, Z. Zhang, Y. Wang, Life prediction methodology of system-in-package based on physics of failure, *Microelectronics Reliability*, 88–90 (2018) 173–178. **IF 1.6**
- **W. Guo**, Y. Li, Z. Sun, SB Vilsen, DI Stroe., Diagnosing NMC Battery Aging modes based on Digital Twin, *245th ECS*, 2024, San Francisco, CA.
- Y. Li, H. Zhao, **W. Guo**, F. Blaabjerg and D. -I. Stroe, "Identification of Lithium-ion Battery Degradation under Fast Charging Protocols," 2024 IEEE Energy Conversion Congress and Exposition (ECCE), Phoenix, AZ, USA, 2024, pp. 2206-2211. Indexed by EI
- **W. Guo**, Z. Sun, SB Vilsen, DI Stroe. Battery health status estimation with partial-charge information using mixed-input LSTM, *ECCE Asia*, 2024, Chengdu, China. **Indexed by EI**
- **W. Guo**, Z. Sun, SB Vilsen, DI Stroe. Solid electrolyte interface layer growth - crack formation coupled model for

Lithium-ion battery capacity fade prediction, *ECCE Europe*, 2023, Aalborg, Denmark. **Indexed by EI**

- S. Jin, X. Yu, X. Sui, **W. Guo**, M. Berecibar and D. -I. Stroe, Features extraction for battery SOH estimation from battery pulsed charging operation, *ECCE Europe*, 2023, Aalborg, Denmark. **Indexed by EI**
- **W. Guo**, Z. Sun, SB Vilsen, DI Stroe. How to identify mechanism consistency for LFP/C batteries during accelerated calendar and cycling aging using the lognormal distribution, *Applied Power Electronics Conference (**APEC**) 2023*, Orlando, US. **Indexed by EI**
- Z. Sun, A.B. Jørgensen, N.Baker, S. Beczkowski, **W. Guo**, S. Munk-Nielsen, F Iannuzzo. (In press). Thermal characteristics of liquid metal interconnects for power semiconductors, *Applied Power Electronics Conference (APEC) 2023*, Orlando, US. **Indexed by EI**
- **W. Guo**, G. Fu, B. Wan, Y. Su, Reliability Assessment Methodology of Power Devices Based on Physics of Failure and Multivariate Copulas. *IEEE Prognostics and System Health Management Conference (PHM) 2019*, Qingdao, China. **Indexed by EI**
- Z. Zhang, G. Fu, **W. Guo**, Y. Su, Single Event Upset Reliability Assessment for RAM Based on Maximum Entropy Principle and Bootstrap, *IEEE Prognostics and System Health Management Conference **(**PHM) 2019*, Qingdao, China. **Indexed by EI**
- G. Fu, **W. Guo**, B. Wan. A Method for Modeling and Verification of Fatigue Failure Physical Model of Micro-sintered Silver Joints Based on Continuum Damage Mechanics, China, 2021. CN 109871655 A **Patent**
- **W. Guo**, G. Fu, Q. Zhang, Y. Su. A device-level sensitive stress screening methodology based on fuzzy class evaluation, China, 2019. CN 112836342 B **Patent**
- G. Fu, **W. Guo**, B. Wan, Y. Su. A reliability assessment methodology of power devices based on multivariate Copula and physics of failure, China, 2019. CN 110298126 B **Patent**

PROJECT EXPERIENCE

- **Vehicle battery storage for green transport and grid stability in the Nordics.**
  Dec. 2024 ~ Present, Co-PI
  - Leverage digital twin technology to simulate vehicle behavior.
  - Extend battery modeling from single cells to module and pack levels for comprehensive system analysis.
  - Achieve intelligent, secure, and efficient connectivity, accelerating EV deployment and enhancing grid stability.
- **Battery pack design for efficient cooling and aging mitigation.**
  Dec. 2024 ~ Present, Participant
  - Model battery aging mechanisms by coupling electrochemical side reactions, thermal fields, and electric fields, starting from the single-cell level and extending to battery pack and vehicle system levels.
  - Extend battery modeling from single cells to module and pack levels for comprehensive system analysis.
  - Optimize battery pack structures and cooling designs to improve thermal distribution, extend battery lifetime, and enhance system reliability.
- **Physics-informed machine learning for lithium-ion batteries degradation prediction.**
  Dec. 2021 ~ Nov. 2024, PI
  - Accelerated aging test, electrochemical and degradation mechanism analysis of Li-ion batteries.
  - Multiphysics simulation using COMSOL that considers electrochemical, mechanical, and temperature coupling effects.
  - Digital twin construction to describe the dynamic aging behavior considering multiple mechanisms coupling.
  - Degradation prediction based on physics-informed machine learning algorithm development.
- **Reliable application of non-pressure sintered micron silver joints in the deep space environment.**
  Oct. 2019 ~ Jan. 2021, The student leader

- Test extreme thermal shock (-170℃~125℃) reliability of sintered micron silver joints.
- Explore the fatigue mechanisms of sintered silver joints, simulate mechanical properties by ANSYS APDL, and establish a physics of failure model to predict lifetime.

- **Characteristics assessment technology of electronic components in ultra-low temperature environment.**
  Mar. 2019 ~ Jan. 2021, The student leader
  - Study failure modes, Memory, Operational amplifier, and Electrical connector failure mechanisms.
  - An assessment methodology to predict the lifetime of electronic components in ultra-low temperature environment using MATLAB.
- **Reliability enhancement testing methodology and process optimization simulation of optical fiber acousto-optic modulator.**
  Mar. 2019 ~ Jul. 2019, The main participant
  - Design a simulation scheme of the bonding process optimization method based on fuzzy class evaluation.
- **Analysis of storage failure mechanisms and life prediction technology of electromagnetic relays.**
  Oct. 2018 ~ May. 2019, The student leader
  - Design a scheme of accelerated storage degradation tests to reproduce failure mechanisms.
  - Establish a storage PoF model of electromagnetic relays and a quantitative relationship between the diffusion rate and temperature.
- **Multivariate copula reliability assessment methodology of power devices (Mentoring Program).**
  Dec. 2018 ~ Apr. 2019, The student leader
  - Find out the weak structure of IGBT using ANSYS Workbench.
  - Establish the assessment methodology based on multi-variable copula.
- **Failure mechanisms and reliability assessment technology of 3D integrated SIP module.**
  Jun. 2018 ~ Dec. 2018, The main participant
  - Study on failure mechanisms and PoF models of dies and interconnects.
  - Complete reliability assessment algorithms of dies and interconnects using MATLAB.

AWARDS

- 245the ECS travel grant $500 for early career researchers, San Francisco, 2024
- Third award in National Digital EVs Competition, Beijing, 2023
- OTTO MØNSTEDS funding for visiting research at Imperial College London, Kr. 24,000, 2023
- Excellent award in the Digital EVs Competition, Beijing, 2023
- ESA BIC incubation funding, € 500,000, 2022
- Excellent award in EV data competition, Shanghai, 2022
- 2nd Prize in Photography Competition, BUAA, 2019
- Entry award on "HUAWEI Cup" The 15th China Post-Graduate Mathematical Contest in Modeling, 2018
- Outstanding Prize on the National Innovation and Entrepreneurship Plan for College Students, 2017
- First Prize in the National Mathematical Contest in Modeling for College Students, Beijing, 2015

HONORS

- Excellent Graduate, Beijing, 2021
- First Prize Academic Scholarship, BUAA, 2018~2020
- Excellent Graduate student, BUAA, 2019
- Outstanding undergraduate, BUAA, 2018
- Merit Student, BUAA, 2018
- First-class Scholarship, BUAA, 2017

- National Inspirational Scholarship, China, 2015~2017

WORKING EXPERIENCE

- Co-founder of BeMarS ApS Dec. 2022~Present
  - Project: Battery management strategy for cube satellite (ESA BIC incubation program)
- CRRC Times Electric Co., Ltd. Jul. 2021~Sep. 2021
  - Project: Reliability and failure analysis of SiC power electronics (Internship)
- GRG Metrology & Test Group Co., Ltd. Jun. 2016~Sep. 2016
  - Project: Quality control and assurance (Internship)

VISITING RESEARCH EXPERIENCE

- Imperial College London, London (Prof. Samuel J Cooper) Jun. 2024~Aug. 2024
  - Project: Intelligent battery aging behavior prediction
- Technical University of Munich, Germany (Prof. Andreas Jossen) Mar. 2024~Jun. 2024
  - Project: Intelligent battery aging behavior estimation and prediction
- Chalmers University of Technology, Sweden (Prof. Torsten Wik and Prof. Changfu Zou) Nov. 2023~Feb. 2024
  - Project: Physics-informed machine learning for battery degradation prediction
- Rutgers University, New Jersey, USA Jul. 2017~Nov. 2017
  - Project: Packaging Reliability Engineering
- The Chinese University of Hong Kong, China Jun. 2016~Sep. 2016
  - Project: Industrial Systems Engineering

RESEARCH ACTIVITY

- Invited speaker for the Automatic Control Division, Department of Electronic Engineering, Chalmers University of Technology, Sweden. Nov. 2023
- COMSOL Multiphysics Intensive Training, Denmark. Oct. 2023
- Organizing Team member of the 26th European Conference on Power Electronics. Sep. 2023
- Present research work in "The Centre of Reliable Power Electronics (CORPE) annual symposium", AAU Energy. Jun. 2023
- Present research work in "AAU Energy Research Day". Apr. 2023/2022
- Present work in "Workshop in future challenges in Power Electronics System Integration and Materials ", AAU Energy. Aug. 2022
- Teaching assistant, Undergraduate simulation laboratory course "Thermal Analysis and Design of Power Systems".
- Reviewers for Journal of Energy Storage, Journal of Power Sources, Renewable and Sustainable Energy Reviews, IEEE Transactions on Power Electronics, Industrial Electronics, Vehicle Technology, Intelligent Transportation Systems, Transportation Electrification, and IEEE Access

PERSONALITIES

- Ambitious, optimized, and hopeful with future energy technology development.
- Good at collaboration and discussion, enjoy exchanging ideas, and inspire each other.
- Never give up easily, always believe I can do it!