Dr. Sontyana Adonijah Graham

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Education

Ph.D.	Electronics and Information Convergence Engineering, Department of Electronics and Information Convergence Engineering, Institute for Wearable Convergence Engineering, Kyung Hee University, Republic of Korea. *Thesis: A study on advanced materials and hybrid nanogenerators for sustainable energy harvesting and IoT applications.*	2018-2023
M.Sc.	Nanoscience and Nanotechnology, at the National Center for Nanoscience and Nanotechnology, University of Madras, Tamil Nadu, India.	2015-2017
B.Sc.	Nanoscience and Nanotechnology, Department of Nanotechnology, Acharya Nagarjuna University, Andhra Pradesh, India.	2012-2015

Research Experience

• Post-doctoral researcher, Department of Energy Science & Engineering, Daegu Gyeongbuk Institute of Science & Technology (DGIST), Republic of Korea. & KAIST InnoCORE PRISM-AI Center, Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea.	10.2025-ongoing
• Post-doctoral researcher, Institute for Wearable Convergence Electronics (IWCE), Kyung Hee University, Republic of Korea.	09.2023 – 08.2024
• Ph.D. Electronic Engineering at the Department of Electronic and Information Convergence Engineering, Kyung Hee University, Republic of Korea.	08.2018 - 08.2023
• Researcher at the "Targeted Imaging and Nanomedicine Laboratory, Department of Biomedical Science, Chonnam National University Medical School, Republic of Korea.	09.2017- 08.2018
• Master's degree project at the Microwave Laboratory, Department of Physics, Indian Institute of Technology (IIT) Madras, Tamil Nadu, India.	06.2016 - 04.2017
• Internship at the Department of Nanoscience and Nanotechnology, Bharathiar University, Tamil Nadu, India.	05.2016 - 06.2016

Publication List (Google Scholar, ORCID) [Impact factor (I.F.), Blue colour – Hyperlink]

Total citations: 2132**, h-index**: 26, **i10-index**: 43

Selected First/co-first authored publications

1. **Sontyana Adonijah Graham**, et. al. Metal-Organic Framework Embedded Electrospun Fibrous Membranes-Based Hybrid Nanogenerators with Hierarchical Modified Polyamide

Films for Mechanical Energy Harvesting and IoT Applications. *Advanced Functional Materials* (2025) e07125, **I.F. 19** (doi.org/10.1002/adfm.202507125).

2. **Sontyana Adonijah Graham**, et. al. "Integrated design of highly porous cellulose-loaded polymer-based triboelectric films toward flexible, humidity-resistant, and sustainable mechanical energy harvesters", ACS Energy Letters (2020) 5, 2140–2148. **I.F. 23.991.** (doi.org/10.1021/acsenergylett.0c00635)
3. **Sontyana Adonijah Graham**, et. al, "Multifunctional thermochromic dye-integrated hybrid nanogenerator for mechanical energy harvesting and real-time sensing", *Advanced Functional Materials* (2024) 2409608, **I.F. 19** (doi.org/10.1002/adfm.202409608)
4. **Sontyana Adonijah Graham**, et. al. "Engineering squandered cotton into eco-benign microarchitectured triboelectric films for sustainable and highly efficient mechanical energy harvesting", Nano Energy (2019) 61, 505-516. **I.F. 19.069** (doi.org/10.1016/j.nanoen.2019.04.081)
5. **Sontyana Adonijah Graham**, et. al. "Triboelectric charge modulation to understand the electrification process in nanogenerators combined with an efficient power management system for IoT applications", Nano Energy (2023) 111, 108413, **I.F. 19.069** (doi.org/10.1016/j.nanoen.2023.108413)
6. **Sontyana Adonijah Graham**, et. al. "Biocompatible electrospun fibers-based triboelectric nanogenerator for energy harvesting and healthcare monitoring", *Nano Energy* (2022) 100, 107455. **I.F. 19.069** (doi.org/10.1016/j.nanoen.2022.107455)
7. **Sontyana Adonijah Graham**, et. al. "Harsh environment–tolerant and robust triboelectric nanogenerators for mechanical-energy harvesting, sensing, and energy storage in a smart home", *Nano Energy* (2021) 80, 105547. **I.F. 19.069** (doi.org/10.1016/j.nanoen.2020.105547)
8. Bhaskar Dudem, **Sontyana Adonijah Graham**, et. al. "Natural silk-composite enabled versatile robust triboelectric nanogenerators for smart applications", *Nano Energy* (2021) 83, 105819. **I.F. 19.069,** (Equal first authorship). (doi.org/10.1016/j.nanoen.2021.105819)
9. **Sontyana Adonijah Graham**, et. al. "Mechanical and Acoustic-Driven Multiferroic-Based Hybrid Nanogenerator for Energy Harvesting and Sensing Applications", *Small* (2024) 2308428, **I.F. 13.3** (doi.org/10.1002/smll.202308428)
10. **Sontyana Adonijah Graham**, et. Al. "Enhanced electrical output via 3D printed dual nanogenerator based on Bi_2WO_6 for mechanical energy harvesting and sensing applications", *ACS Sustainable Chemist and Engineering* (2024) 12, 785-794, **I.F. 9.224**. (doi.org/10.1021/acssuschemeng.3c05245) (Co-first author).

Selected Co-authored/Collaboration publications

1. Seneke Chamith Chandrarathna, **Sontyana Adonijah Graham**, et. al. "An Efficient Power Management System Using Dynamically Configured Multiple Triboelectric Nanogenerators and Dual-Parameter Maximum Power Point Tracking", *Advanced Energy Materials* (2022) 12.2, 2103249. **I.F. 29.698** (doi.org/10.1002/aenm.202103249)
2. Harishkumarreddy Patnam, **Sontyana Adonijah Graham**, et. al. "Highly-flexible and harsh temperature-tolerant single-electrode mode triboelectric nanogenerators via

biocompatible ionic liquid electrolytes for wearable electronic applications", *Advanced Composite Hybrid Materials* (2024) 7(2), 5, **IF: 20.1** (doi.org/10.1007/s42114-024-00845-2)

3. Anand Kurakula, **Sontyana Adonijah Graham**, et. al. "Multimodal Energy Generation and Intruder Sensing Platform via Aluminum Titanate/Poly-Glucosamine Composite Film-Based Hybrid Nanogenerators", *Advanced Functional Materials* (2024) 2307462. **I.F. 19** (doi.org/10.1002/adfm.202307462)
4. Mandar Vasant Paranjape, Jun Kyu Lee, Punnarao Manchi, **Sontyana Adonijah Graham**, et. al. "Phosphor-Loaded Triboelectric Film-Based Multipurpose Triboelectric Nanogenerators for Highly-Efficient Energy Harvesting, Sensing, and Self-Illumination Applications", *Advanced Functional Materials* (2024) 2405838. **IF: 19** (doi.org/10.1002/adfm.202405838)
5. Punnarao Manchi, Mandar Vasant Paranjape, **Sontyana Adonijah Graham**, et. al. "Niobium-Doped Bismuth Titanate-Loaded PVDF-HFP Flexible Composite Films for Self-Powered Stair Sensing and Emergency Alert Applications via Hybrid Mechanical Energy Harvesters", *Advanced Functional Materials* (2024) 2400371. **I.F. 19 (**doi.org/10.1002/adfm.202400371**)**
6. Paranjape Mandar Vasant, **Sontyana Adonijah Graham**, et. al. "Microarchitectured Strontium Doped Silver Niobate Embedded Ecoflex Composite Films for Highly Efficient Box-type Mechanical Energy Harvesters", *Nano Energy* (2023) 109005. **I.F. 19.069** (doi.org/10.1016/j.nanoen.2023.109005)
7. Paranjape Mandar Vasant, **Sontyana Adonijah Graham**, et. al. "Microarchitectured Strontium Doped Silver Niobate Embedded Ecoflex Composite Films for Highly Efficient Box-type Mechanical Energy Harvesters", *Nano Energy* (2023) 109005. **I.F. 19.069** (doi.org/10.1016/j.nanoen.2023.109005)
8. Mandar Vasant Paranjape, **Sontyana Adonijah Graham**, et. al. "3D printed bidirectional rotatory hybrid nanogenerator for mechanical energy harvesting", *Nano Energy* (2021) 88, 106250. **I.F. 19.069** (doi.org/10.1016/j.nanoen.2021.106250)
9. Kavarthapu Venkata Siva, **Sontyana Adonijah Graham**, et. al. "Electrospun $ZnSnO_3$/PVDF-HFP Nanofibrous Triboelectric Films for Efficient Mechanical Energy Harvesting", *Advanced Fiber Materials* (2023), 1-14. **I.F. 16.1** (doi.org/10.1007/s42765-023-00295-3)
10. Chandrarathna Seneke Chamith, **Sontyana Adonijah Graham**, et. al. "Analysis and Experiment of Self-Powered, Pulse-Based Energy Harvester Using 400 V FEP-Based Segmented Triboelectric Nanogenerators and 98.2% Tracking Efficient Power Management IC for Multi-Functional IoT Applications", *Advanced Functional Materials* (2023), 33.17, 2213900. **I.F. 19.924** (doi.org/10.1002/adfm.202213900)

Technical Skills

- ***Micro/Nanofabrication & Processing***
  Patterning: Soft imprint lithography, photolithography, thermal imprint lithography. **Thin-Film Deposition**: RF/DC magnetron sputtering, plasma-enhanced chemical vapor deposition (PECVD), electron-beam evaporation, thermal evaporation. **Chemical**

Synthesis: Chemical bath deposition, co-precipitation, anodization, electrodeposition, electropolishing. **Etching**: Inductively coupled plasma (ICP) etching, wet chemical etching

- ***Materials & Device Characterization***
  Structural & Surface Analysis: Scanning electron microscopy (SEM), atomic force microscopy (AFM), Kelvin probe force microscopy (KPFM), 3D laser scanning, confocal microscopy. **Spectroscopic & Compositional Analysis**: Raman spectroscopy, UV–Vis–NIR spectroscopy, Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS). **Electrical & Functional Measurements**: Dielectric and ferroelectric measurements; oscilloscope-based analysis (Tektronix), current preamplifiers, Keithley 6514 electrometer for nanogenerator and sensor performance evaluation
- ***Software & Data Analysis***
  Simulation: COMSOL Multiphysics (finite element modeling). **Modeling & Analysis**: Autodesk 3ds Max, Origin, LabVIEW
- **Research & Collaboration**
  Independent and collaborative research experience, including experimental design, device fabrication, data interpretation, and mentoring of PhD and master's students within multidisciplinary research teams

Selected Conference Presentations

1. **Sontyana Adonijah Graham**, J.S. Yu. "Multiferroic-based triboelectric nanogenerator for energy harvesting and sensing applications." The 21st International Nanotech Symposium & Exhibition, Nano Korea 2023 Symposium, Kintex, Korea, July 5, 2023. (**Oral presentation**)
2. **Sontyana Adonijah Graham**, J.S. Yu. "Wearable triboelectric nanogenerator based on enhanced charge carrier triboelectric film for harvesting mechanical energy," 2022 *Korea Research Fund University Focused Research Institute Performance Exchange Meeting in the Field of Science and Engineering*, Korea, Oct. 12, 2022. (**Poster presentation**).
3. **Sontyana Adonijah Graham**, J.S. Yu. "Synthesis of bismuth composite-based hybrid metamaterials for discrete energy harvesting," *European Material Research Society in Warsaw*, Poland, Sep. 19-22, 2022. (**Oral presentation**).
4. **Sontyana Adonijah Graham**, J.S. Yu. "Electrospun biocompatible fibers as a tribosensor for human body motion" *The 20th International Symposium on the Physics of Semiconductors and Applications*, Jeju, Korea, July 17-21, 2022. (**Oral presentation**).
5. **Sontyana Adonijah Graham**, J.S. Yu. "Harsh environment-tolerant and robust triboelectric nanogenerators for mechanical energy harvesting, sensing and energy storage in a smart home" *The Korean Physical Society*, Korea, Nov. 4-6, 2020 (**Oral presentation**).

Selected International and National Awards and Achievements

1. **Graduate student award**, in recognition of an outstanding paper entitled "Synthesis of bismuth composite-based metamaterials for discrete energy harvesting" European – Material Research Society (E-MRS) 2022 fall meeting, Warsaw University of Technology, Poland (Sep. 2022)

2. **Excellent patent award**, awarded by the BK21 convergence future communication innovation talent cultivation, "Patent title: Cotton-based high conductivity triboelectric nanogenerator". Kyung Hee University, Republic of Korea (Nov. 2021)
3. **Best presentation award** (oral presentation), in recognition of an outstanding research work presentation entitled "Engineering biomaterials for sustainable and autonomous electronic devices" 1st International Virtual Conference on Nanomaterials, India. (Sep. 2020)
4. **Best poster presentation award**, in recognition of an outstanding research work presentation entitled "Fabrication and characterization of micropatterned cellulose films for energy generation" Korean Polymer Society, Republic of Korea (Feb. 2019)

Selected Patents

1. Cotton-Based Biodegradable Nano Power Generation Device, Org. Korean Intellectual Property Office. Ref. No. 10-2020-0144708, Approved date: 2019-06-19,
   Inventor names: Jae Su Yu, ***Sontyana Adonijah Graham****, and Dudem Bhaskar*
2. Smart Home Mechanical Energy Harvesting, Sensing and Energy Storage by Cotton-Based Triboelectric Nanogenerator, Org. Korean Intellectual Property Office. Ref. No. 10-2022-0119871, Approved date: 2021-02-22,
   Inventor names: Jae Su Yu, and ***Sontyana Adonijah Graham****.*
3. 3D Printed Bidirectional Rotating Hybrid Nanogenerator for Mechanical Energy Harvesting, Org. Korean Intellectual Property Office. Ref. No. 10-2023-0061870, Approved date: 2021-10-29.
   Inventor names: Jae Su Yu, Paranjape Mandar Vasant,and ***Sontyana Adonijah Graham****.*
4. Micropatterning to Release High Surface Area Triboelectric Films for Multimode Operation Triboelectric Nanogenerator, Org. Korean Intellectual Property Office. Ref. No. 10-2023-0085496, Approved date: 2021-12-07
   Inventor names: Jae Su Yu, and ***Sontyana Adonijah Graham****.*

News Report

- New Self-powered Energy Supply Device Harvests Electricity during Everyday Activities. Kyung Hee Univesity Focus. 2020-09-07
  Web link: Kyung Hee University (khu.ac.kr).
- Harvesting Electric Energy from Physical Exercise in Everyday Life. Kyung Hee Univesity Focus. 2022-02-07
  Web link: Kyung Hee University (khu.ac.kr).
- Development of eco-friendly, high-efficiency triboelectric nano power generation device. Kyung Hee Univesity Focus. 2023-07-17
  Web link: Kyung Hee University (khu.ac.kr).

Reference

Will be provided upon request.