

EUGENE SEFA APPIAH, PhD.

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University of Energy and Natural Resources
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RESEARCH INTEREST

Urban mining and waste management
Electrochemistry and corrosion
Heat treatment and physical Metallurgy.
Supercapacitor and Energy materials

EDUCATION

PhD Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
Materials engineering January 2022 – March 2025

Dissertation: Synthesis of Nano-Porous Carbon Sandwiched with P-doped Iron Oxide via 3-D Diatomite for Supercapacitor Application

Committee: Professor Kwadwo Mensah-Darkwa (chair/supervisor), Professor Anthony Andrews (member), Dr. Frank Ofori Agyemang (member), Dr. Martinson Nartey Addo (member), Professor Katlego Makgopa (co-supervisor).

MPhil Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
Materials engineering September 2019 – December 2021

Thesis: Performance evaluation of waste tyre derived carbon as a hybrid supercapacitor electrode.

Advisors: Professor Kwadwo Mensah-Darkwa, Dr. Frank Ofori Agyemang, Professor Anthony Andrews

BSc Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
Materials engineering August 2014 – July 2018

Grade: Second class upper division

Thesis: Effect of heat treatment on the mechanical properties of a refurbished excavator bucket pin.

Advisor: Professor Anthony Andrews

EXPERIENCE

Assistant lecturer

University of Energy and Natural Resources, Sunyani, Department of Sustainable Mineral Resource Development
August 2024 – Present.

- Lecturing Urban Mining and Development minerals mining courses

Part-time Assistant lecturer

Sunyani Technical University, Department of Materials engineering January – December 2024.

- Lecturing chemical kinetics, Advance welding, and Introduction to welding.
- Supervision of final year project titled “Design and fabrication of low temperature heat treatment furnace”.

Doctoral fellowship

Aalto University, Espoo, Finland November-December 2023

- Investigation of the Corrosion Behaviour of Cu-Plate Current Collector under Cyclic Stability Testing in a Supercapacitor Cell for Energy Storage Application.
- Effect of annealing on the grain structure and mechanical properties of copper plate using EBSD and Nanomechanical testing.

Doctoral Researcher

Kwame Nkrumah University of Science and Technology, Kumasi, Ghana 2022-2024
Synthesis of porous nanostructured carbon and iron oxide nanoparticles via 3-D diatomite framework for supercapacitor application.

Supervisor: Professor Kwadwo Mensah-Darkwa

- Develop a two-step diatomite synthesized waste tyre porous carbon material (nanostructured porous carbon)
- Produce iron oxide (Fe_2O_3) nanostructured pseudocapacitor electrode material from a 3-D diatomite structure.
- Fabricate and characterize the various electrode materials chemically and electrochemically.
- Assembling of an asymmetrical supercapacitor using a coin cell and test its performance.

Research and development intern.

Comeph & Associates Company Limited 2022

Supervisor: Professor James Ephraim and Mr. Michael Commeh

- Led the following research and projects, charring and ashing of cassava peels for bio-cement application, the construction of an institutional clean cook stove with a solar-powered blower at St. Louis Jubilee School, the construction of a pyrolyzer, data collection through questionnaires on the Nsupa Ceramic Water Filters and moulding of bio-cement block (using Rice husk ash (RHA), kaolin, laterite, and cement in their right proportion).
- Water boiling test using three different sources of fuel (charcoal, bamboo char, and briquette) on four different commercial stoves to assess fuel efficiency.
- Design and conceptualize a research proposal for the Sustainable Manufacturing and Environmental Pollution Programme (SMEPP) grant.

Research and development intern.

Kumasi Hive Company Limited

2020

- Studied the use of nanostructured materials in manufacturing nanostructured solar cells, specifically the manufacturing of multi-layered solar cells.

Master of philosophy, Research student.

Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

2019-2021

- Led several brainstorming sessions, conferences, workshops, and scheduled meetings to assess the electrochemical performance of the waste tyre derived carbon obtained from Alchemy Alternative Energy through a research funding program called Strengthening Engineering Ecosystem in Sub-Saharan Africa “SEESA”.
- Supervised the academic, publishing, and experimental works of undergraduate students.

Research and development intern.

Comeph & Associates Company Limited

2019

Supervisor: Professor James Ephraim and Mr. Michael Commeh

- Cookstove project at the Osu night market for the member of parliament for Klottey Korle constituency, Hon. Dr. Zanetor Agyemang-Rawlings.
- Installation of a waste management system at Chirano Gold Mines Limited (Kinross Gold Corporation).
- Cookstove project at Wesley Girls Senior High School, Yaa Asantewaa Senior High School, K.N.U.S.T. Senior High School, and Oil production community at Bekwai Zongo sponsored by the UNDP Ghana.
- Cookstove and Biogas project at Our Lady of Grace Senior High School.

Research Assistant

Technology Consultancy Centre (TCC), K.N.U.S.T.

2018-2019

Advisor Name: Mr. Michael Commeh

- Supported lecturers and research fellows in the facilitation of university level courses and projects in the engineering discipline.
- Led and supported international projects and conferences such as “energizing Ghana Cocoa/ENGHACO” which was a collaboration between SRH Hochschule Berlin, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, and The University of Ghana, Accra, Ghana.
- Also presented at a conference titled “Implementation of bio-rural energy scheme (IBRES) for Ghana “Special Equipment Impacts Acceleration Workshop” in collaboration with global challenges research fund (GCRF), University of Nottingham, K.N.U.S.T., CEESD”.

HONOURS AND AWARDS

Aalto University Research Fellowship & Exchange Program: November-December 2023

The grant was provided through the Ministry of Education and Culture Global South Programme, Finland.

Environmental Sanitation Research Fund (ESRF), Grant: March 2022 – March 2023

Jospong Group of companies, Accra-Ghana.

The award was a one-time payment of 100,000 GHS to support postgraduate research.

Africa Centre of Excellence-KNUST Engineering Education Program Scholarship Award **2022 - 2024**

Full funding scholarship for the Doctoral research program

Strengthening Engineering Ecosystem in Sub-Saharan Africa Graduate Research Scholarship Award **2020 - 2021**

The award was a one-time payment of 15,000 GHS to support postgraduate research.

Most Improved Student Award
Materials engineering, K.N.U.S.T.

2016

PUBLICATIONS

Journal Publications

Perseverance Dzikunu, **Eugene Sefa Appiah**, Emmanuel Gikunoo, Emmanuel Kwesi Arthur, Mensah-Darkwa Kwadwo, Akinwamide Samuel Olukayode, and Villaca Pedro (2024): Waste-to-carbon based supercapacitors for renewable energy storage: Progress and future prospectives. (*Materials for Renewable and Sustainable Energy, Springer Nature*).

Eugene Sefa Appiah, Akinwamide Samuel Olukayode, Fangnon Eric A. K., Mensah-Darkwa Kwadwo, Anthony Andrews, Agyemang Frank Ofori, Addo Narthey Martinson, Makgopa Katlego, and Villaca Pedro (2024): Corrosion Behaviour of Cu-Plate Current Collector under Ex-Situ Cyclic Stability Testing for Energy Storage Application. (NXMATE-D-24-00871R3-Next Materials, Elsevier)

Eugene Sefa Appiah, Perseverance Dzikunu, Akinwamide Samuel Olukayode, Fangnon Eric A. K., Mensah-Darkwa Kwadwo, Anthony Andrews, Agyemang Frank Ofori, Addo Narthey Martinson, Makgopa Katlego, and Bossuyt Sven (2024): A Review on Progress and Prospects of Diatomaceous Earth as A Bio-Template Material for Electrochemical Energy Storage: Synthesis, Characterization, and Applications. *Ionics, Springer Nature*, <https://doi.org/10.1007/s11581-024-05825-6>

Eugene Sefa Appiah, Kwadwo Mensah-Darkwa, Anthony Andrews, Frank Ofori Agyemang, Martinson Addo Narthey, Katlego Makgopa, Yongdan Hou, Patrick Aggrey, and David Ato Quansah (2024): Tailoring Hierarchical Porous Carbon Electrode from Carbon Black via 3D Diatomite Morphology Control for Enhanced Electrochemical Performance. *Nanoscale Advances, RSC* <https://doi.org/10.1039/D4NA00680A>

Kwadwo Mensah-Darkwa, Frank Ofori Agyemang, Mahadeen N. Nashiru, **Eugene Sefa Appiah**, Fredrick Aziadzo, Patrick Aggrey, Daniel Nframah Ampong, Martinson Addo Narthey, Emmanuel Kwesi Arthur, Emmanuel Gikunoo, and Ram K. Gupta (2024): Graphene

oxide from coconut shells for high-performance supercapacitor application. *Discover Electrochemistry*, Springer Nature, <https://doi.org/10.1007/s44373-024-00005-7>

Eugene Sefa Appiah, Kwadwo Mensah-Darkwa, Frank Ofori Agyemang, Phillip Agbo, Mahadeen N. Nashiru, Anthony Andrews, Mark Adom-Asamoah (2022): Performance Evaluation of waste tyre activated carbon as a hybrid supercapacitor cells. *Journal of Materials Chemistry and Physics*, <https://doi.org/10.1016/j.matchemphys.2022.126476>

Eugene Sefa Appiah, Anjali Gupta, Mahadeen Nanzumani Nashiru, Daniel Nframah Ampong, Frank Ofori Agyemang and Kwadwo Mensah-Darkwa (2022): Biowaste-based porous carbon for Supercapacitor: Synthesis, Fabrication and Electrochemical performances: A review. *Current Materials Science*, <https://doi.org/10.2174/2666145415666220517103417>

Eugene Sefa Appiah, Perseverance Dzikunu, Nashiru Mahadeen, Daniel Nframah Ampong, Kwadwo Mensah-Darkwa, Anuj Kumar, Ram K. Gupta and Mark Adom-Asamoah (2022): Biopolymers-Derived Materials for Supercapacitors: Recent Trends, Challenges, and Future Prospects. *Molecules*. <https://doi.org/10.3390/molecules27196556>

Nashiru Mahadeen Nanzumani, Frank Ofori Agyemang, Kwadwo Mensah-Darkwa, **Eugene Sefa Appiah**, Emmanuel Kwesi Arthur, Emmanuel Gikunoo, Bennetta Koomson, Amol R. Jadhav, and Akeem Raji, (2022): Molten Salt Synthesis of Nitrogen-doped Hierarchical Porous Carbon from Plantain Peels for High Performance Supercapacitors. *Journal of Electroanalytical Chemistry*, <https://doi.org/10.1016/j.jelechem.2022.116645>

Michael K. Commeh, Zenator Agyemang Rawlings, **Eugene Sefa Appiah**, Fritz Ziebell, (2019); Promotion of Carbon Footprint Development Mechanism: A Case Study of Osu Night Market, <https://www.tsijournals.com/articles/promotion-of-carbon-footprint-development-mechanism-a-case-study-of-osu-night-market-14546.html>

PROFESSIONAL DEVELOPMENT TRAINING

Workshop

Transforming leadership and governance seminar part iv, Kumasi Ghana organized by international foundation university, international leadership foundation.

Conferences/Seminars/Webinars

Ghana Institution of Engineering (GhIE) 2022 ANNUAL CONFERENCE AND 52ND ANNUAL GENERAL MEETING, Engineering, Key to Achieving National Development”.

Implementation of bio-rural energy scheme (Ibres) for Ghana “special equipment impacts acceleration workshop” in collaboration with global challenges research fund (gcrf), university of Nottingham, K.N.U.S.T., Ceesd.

Srh hochschule berlin in collaboration Kwame Nkrumah university of science and technology and university of Ghana “enghaco engineering requirement baseline conference”

LANGUAGES

English: High levels in Listening, Speaking, Reading, and Writing.

Twí: Listening and Speaking

OTHER SKILLS AND COMPETENCES

Introduction to Math lab programming and solid works, MS. Office suit, CES Edu-pack, advanced learning in Origin Lab, Electrochemical workstation, MS Project – Project Scheduling and drawio.

OTHERS

Mentoring students on career paths and public speaking

REFERENCES

- Dr. Abdul Wadood Moomen

Head of the department

Department of Sustainable Mineral Resource Development

University Energy and Natural Resources, Sunyani.

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Relationship: Head of Department

- Professor Kwadwo Mensah-Darkwa

Department of Materials Engineering

Kwame Nkrumah University of Science and Technology, Kumasi

kmensahd@gmail.com

+233544387772

Relationship: PhD supervisor

- Professor Anthony Andrews

Director

Institute of Distance Learning

Kwame Nkrumah University of Science and Technology, Kumasi

anthonydrews@gmail.com

+233541019379

Relationship: PhD committee member

- Prof. Makgopa Katlego

Department of Chemistry

Tshwane University of Technology, Pretoria.

MakgopaK@tut.ac.za

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Relationship: PhD committee member

- Mr. Michael Commeh

Senior Research Fellow
Technology Consultancy Center, K.N.U.S.T
Mcommeh.tcc@knust.edu.gh
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Relationship: Supervisor