

TRACY ASAMOAH

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BRIEF STATEMENT

Tracy is a self-motivated learner with a passion to improve her skills. She is a multitasking individual and professional who can identify challenges and create innovative solutions. Her hard work and dedication earned her three Provost's Honor Awards, two competitive university-wide research grants, and had the highest average recorded in her department during her undergraduate.

RESEARCH INTERESTS

Energy and sustainability research utilizing both theoretical and experimental approaches with applications in catalysis, fuel cells, batteries, CO₂ capture and wastewater remediation

EDUCATION

Kwame Nkrumah University of Science and Technology (KNUST)

Aug 2018 - Nov 2022

BSc. Materials Engineering | *summa cum laude* | CWA: 80.27% | Provost's list | Class Rank: 1st

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Advanced Coursework: Battery materials, Homogeneous catalysis, Quantum chemistry

AWARDS & GRANTS

- Nana Opoku Foundation Award: Best Graduating Female Student, **100 USD** **2023**
- Provost's Overall Best Graduating Student, Department of Materials Engineering (**1 out of 82 students**) **2022**
- 3x Provost's Excellent Students' Award (**Top 1% of students in the college**) **2023, 2022, 2021**
- Green Energy Challenge Finalist (**3rd out of 54 contesting teams**) **2022**
- 2x Community Project Award **2022, 2021**
- SEESA Research Grant Award: **5% acceptance rate** **2021**
- KEEP Research Grant Award 'College of Engineering Innovation Challenge', Team Lead: **Top 10%** **2021**

TEACHING EXPERIENCE

Kwame Nkrumah University of Science and Technology

Evaluation Scale: 1-5 (1= Excellent)

- Teaching Assistant for Computer Applications-** (MSE 360) Course Evaluation: **1.29**, Tutorials Evaluation: **1.0** **Summer 2023**
* Led 10 teams to study & model phase diagrams of hydrogen (eg. Na-Al-H) for chemical storage of hydrogen in the crystals
- Teaching Assistant for Strength of Materials-** (ME 255) Course Evaluation: **1.1**, Tutorials Evaluation: **1.14** **Spring 2023**
* Provided one-on-one instruction for 50 students and achieved 91% passing with A & B+

SELECTED RESEARCH PROJECTS

Understanding the Photocatalytic Properties of MHOs: A DFT Study

July 2023 - Present

Summer Intern | Supervisor: Dr. Caroline Kwawu

KNUST

- Introduced 4 functional groups in the linkers to enhance seawater photocatalysis in the visible spectra
- Designed 6 varying linker rotations (0°, 30°, 60°, 90°, 120°, 180°) for optimum selectivity and stability of MHOs

Modelling Hydrogen Storage and CO₂ Capture of MOFs using CGCNN : A Computational Study

July 2022 - Dec 2023

Research Assistant | Supervisor: Prof. Kweku Achenie

Virginia Tech/ KNUST

- Screened 20,000 MOFs using crystal graphs neural networks to study and classify the MOFs for H₂ storage and CO₂ capture
- Generated 4 novel MOFs with excellent, tailored properties for H₂ storage and CO₂ capture
- Co-authored 2 publications under final review in Physical Review Letters

Investigating the Reusability of Spent Batteries: A Study on LiMn₂O₄ Batteries

Sept 2023 - Nov 2023

Research Assistant | Supervisor: Dr. Kwadwo Mensah-Darkwa

KNUST

- Investigated the end of life of Li-ion and solid-state batteries
- Resulted in a first author publication in Chemrxiv and won the best poster award at 2023 ICGET-Tw

Investigating Ternary Oxides for Electrocatalysts

July 2023 - Oct 2023

Research Assistant | Supervisor: Dr. Kwadwo Mensah-Darkwa

KNUST

- Investigated 80 ternary oxides for electrocatalytic activity, selectivity and stability during OER, ORR, HER, CO₂RR
- Resulted in a first author publication in Chemrxiv

Tuning Toxic Gas Molecules on H-WS₂ Nanoribbons for High performance Catalysts: DFT Approach

May 2023 - Oct 2023

Summer Intern | Supervisor: Dr. Caroline Kwawu

KNUST

- Designed 5 H-WS₂ systems (Ni, Co, Pt, Fe-doped and pristine) for H₂S & SO₂ sensors & catalysts using first principles
- Achieved 90% H₂S reduction using Ni doped H-WS₂ catalyst and 95.8% SO₂ reduction using Co doped H-WS₂
- Contributing author publication in Chemrxiv

Investigating the Effect of Indigenous Carbonization on Coconut Shells for Supercapacitor Electrodes

Jan 2023 - Aug 2023

Research Assistant | Supervisor: Dr. Kwadwo Mensah-Darkwa

KNUST

- Achieved the highest specific capacitance of 370.9 F/g at 10 mV/s

Extracting TiO₂ from Mfensi Kaolin for Photocatalytic Purification of Wastewater

Jan 2023 - Aug 2023

Research Assistant | Supervisor: Dr. Kwadwo Mensah-Darkwa

KNUST

- Attained anatase phase TiO₂ from local kaolin as verified by XRD via selective flocculation
- Achieved 95.64% degradation of coliform from wastewater which was higher than that of commercial TiO₂

Delaying Recrystallization of Phase Change Materials in Solar Cookers

Nov 2021 - Sept 2022

Student Lead Investigator | Capstone Project | SEESA Research Grant | Supervisor: Dr. Kwadwo Mensah-Darkwa

KNUST

- Achieved 90% delayed recrystallization for 30% erythritol-PVA via thermal cyclings using Arduino operated sensors and Matlab
- Procured the 5% acceptance rate SEESA research grant as the team lead and won the 2nd place for the best department poster

- Presented it at the 8th Global Webinar on Materials Science and Engineering conference

Synthesizing Ternary Oxides as Precursors for Cupels

Nov 2020 – Nov 2022

Student Lead Investigator | KEEP Research Grant (Top 10%) | Supervisor: Dr. Bennetta Koomson

KNUST

- Achieved 90.3% of Pb recovery from spent cupels and synthesized MgO from the residue
- Obtained 99% purity of CaO from sodium hypochlorite residue as verified by XRD
- Filed a patent application and presented it at BSU III-AIRIC 2023 and ESTE'22

PUBLICATIONS

- **T. Asamoah**, E. Siaw, A. Ayodeji, K. Mensah-Darkwa, 'Recent advances of ternary oxides in electrocatalytic reactions and the prospect of computational tools', *Chemrxiv*, Oct 2023
- **T. Asamoah**, E. Siaw, K. Mensah-Darkwa, 'Recycling and recovery of components from spent batteries: a mini review on LiMn2O4 batteries', *Chemrxiv*, Oct 2023
- **T. Asamoah**, A. O. A. Antwi, K. Mensah-Darkwa, 'MoS2 as a bifunctional electrocatalyst for overall water splitting', *Chemrxiv*, Nov 2023
- S. Atsu, **T. Asamoah***, J. K. Arhin, P. A. Fordjour, C. Kwawu, 'Effect of doping on hexagonal WS2 nanoribbons as a high performance sensor and catalyst for H2S and SO2 reduction', *Theoretical Chemistry Accounts*, Dec 2023 (*contributed equally in this work)
- S. K. Asiedu, **T. Asamoah***, S. Akutey, K. Achenie, 'Multi-classification of MOFs for hydrogen storage using crystal graph convolutional neural networks', *Physical Review Letters under final revision*, Dec 2023 (*contributed equally in this work)
- S. K. Asiedu, **T. Asamoah***, S. Akutey, E. N. A. Doku, K. Achenie, 'Multi-classification of MOFs for CO2 capture using crystal graph convolutional neural networks', *Physical Review Letters under revision*, Jan 2024 (*contributed equally in this work)

PATENTS

- **T. Asamoah**, S.A. Baffour, V. Appiah, S. B. Antwi, J. Gyebi, A. Andrews, B. Koomson, 'Ternary oxides as precursors for cupels', GH Patent Application, Nov 2023

CONFERENCE PRESENTATIONS

- **T. Asamoah**, 'Recycling and Recovery of Components from Spent Batteries: A Mini Review of LiMn2O4 Batteries', *Proceedings of the 2023 International Conference on Green Electrochemical Technologies and the 2023 Annual Meeting of the Electrochemical Society of Taiwan (ICGET-TW)*, Oct. 26-28, 2023
- **T. Asamoah**, K.K. Asiedu, F. Sakyi, D.A. Mantey, 'Modification of Erythritol-based PCMs for Improved Efficiency in Solar Cookers', *Proceedings of the 8th Global Webinar on Materials Science and Engineering conference*, Nov 23-24, 2023
- **T. Asamoah**, S.A. Baffour, V. Appiah, B. Koomson, 'Compositional Characterization of Spent Cupels and NaOCl Residue as Precursors for Engineering Materials', *Proceedings of Building Stronger Universities III - Academia-Industry and Research Innovation Conference (BSU III -AIRIC)*, Sept 12, 2023, pp. 71.
- **T. Asamoah**, S. A. Baffour, S. A. Badu, B. Koomson, A. Andrews, 'Production of Magnesia Cupels from Pumpkin Seeds and Spent Cupels', *Proceedings of the 3rd Engineering, Science, Technology, and Entrepreneurship (ESTE '2022) Conference*

EXTRACURRICULARS, LEADERSHIPS & MENTORSHIP

- **MIH Training and Development Head**
*Organized virtual resume tailoring & research workshops for 120 students
- **Solar Cookers for Second Cycle Institutions**
*Achieved 85% solar conversion efficiency for cooking
- **Constructing Plastic Waste Bridges**
*Designed 4 prototypes of bridges, directed & aided the workers in constructing 2 bridges
- **MATESA Academic Board Chair**
*Uploaded 100+ course materials onto an online library for all student levels in the department
- **College WinE Representative**
*Empowered 20 ladies class-wise with soft skills in coding, public speaking and time management
- **GESA Board of Mentors**
*Coached 30 marginalized students, one-on-one on the complexities of the academic journey

TECHNICAL SKILLS

Programming Languages Python, Matlab, R, Arduino, **Latex**, C++

Deep Learning Frameworks Pytorch, Tensorflow, MatMiner, Sckit-learn, Keras, CGCNN, Pymatgen

Materials Modelling DFT : Quantum Espresso & VASP, MS Maestro, LAMMPS, Vesta, Materials Studio, ML

Languages English (Native), French (working proficiency)

Others XRD, XRF, GCD, FT-IR, AAS, Proficient in technical writing, materials characterization, MS Office Suite, **Public Speaking**

ACADEMIC & PROFESSIONAL AFILIATIONS

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| • Member, Society of Women Engineers | 2022 |
| • Member, Black in AI | 2022 |
| • Executive Member , Materials Innovation Hub | 2022 |
| • Member, National Society of Black Engineers | 2021 |
| • Executive Member , Australasian Institute of Mining and Metallurgy | 2021 |