

OLUMIDE SAMUEL OGUNMODIMU

CAREER PROFILE

Olumide Ogunmodimu is an assistant professor in the Department of Energy and Mineral Engineering (EME) at the Pennsylvania State University. He is also a co-funded faculty of the Institute for Computational and Data Sciences (ICDS) and the Materials Research Institute (MRI). Olumide obtained his B.Sc. in Physics and Solar Energy from Bowen University Iwo, Nigeria and holds a master's degree in Energy studies and a PhD in Chemical Engineering (specializing in the areas of comminution and classification in mineral processing) from the University of Cape Town, South Africa. Before he joined Penn State University, he worked as a postdoctoral fellow at the University of Cape Town, South Africa and the Julius Kruttschnitt Mineral Research Centre (JKMRC) at the University of Queensland, Australia.

Olumide's research spans the complete value chain of mineral processing research. His research specialization explores complex granular flow modelling, including particle breakage and their rheological and electrochemical properties using Positron Emission Particle Tracking (PEPT), continuum formulations of industrial flows, and numerical modelling via the Discrete Element Method (DEM), Computational Fluid Dynamics (CFD) and Smoothed-particle hydrodynamics. He combines his knowledge of natural science, advanced mathematics and process engineering to conduct cutting-edge research to foster innovation and ensure sustainable and efficient mineral processing.

AREAS OF EXPERTISE

- Project Management
- Numerical Modelling
- Fluid Dynamics
- Comminution & Particle Technology
- Energy systems optimization modelling
- Positron Emission Particle Tracking (PEPT)
- Process Improvement
- Granular Flow Rheology
- Data Analysis

PROFESSIONAL EXPERIENCE

PENN STATE COLLEGE OF EARTH AND MINERAL SCIENCES, DEPARTMENT OF ENERGY AND MINERAL ENGINEERING

2023 to date

Penn State is Pennsylvania's sole land-grant institution, founded with a mission of high-quality teaching, expert research, and global service.

Assistant Professor

- Conducting and supervising research in Energy and Minerals Engineering.
- Teaching undergraduate and postgraduate courses in Energy, Minerals processing, Computational modelling, and Material science
- Mentoring postgraduates and emerging researchers

WEIR MINERALS AUSTRALIA, 1834 DANDENONG ROAD, CLAYTON VICTORIA 3168, AUSTRALIA

2021 to 2023

Weir Minerals is a global market leader that provides trusted technology and services which make mining operations more productive and profitable.

Research Technical Documentation Lead

- Created engaging written technical manuals and bulletins that enhanced knowledge transfer within Weir and with Customers.
- Developed technical publication roadmaps and create content that fulfills them.
- Provided technical guidance on comminution technology optimisation.
- Assisted with model development and experimental data curation.
- Promoted collaboration, partnership and relationships among the internal and industry target audiences.
- Partnered and collaborated with other learning professionals and business partners to deliver consistent learning experience.

JULIUS KRUTTSCHNITT MINERAL RESEARCH CENTRE, SUSTAINABLE MINERALS INSTITUTE, UNIVERSITY OF QUEENSLAND BRISBANE, AUSTRALIA

2018 to 2020

The Sustainable Minerals Institute (SMI) at the University of Queensland (UQ) is a research institute focused on understanding & implementing the principles of sustainable development through engagement with industry contacts from geology to mining, processing & disposal.

Research Fellow

- Analysed multiple methods of designing energy efficient comminution circuits at University of Queensland.
- Co-led postgraduate research work on energy efficient comminution circuits design.
- Worked with Advanced Process Prediction & Control (APPCo) group to confirm multicomponent equipment prototypes in Integrated Extraction Simulator (IES). Utilized CFD to review hydrodynamics of coarse particles in flotation cells.
- Supervised undergraduate honours student's thesis. Manage about 30 visiting students from USA, Chile, Australia, & South Africa.
- Enhanced breakage model for internal DEM solver to determine shear stress leading to rock breakage.

- Employed DEM & CFD to model & design efficient fine particle grinding in stirred mill with alternative stirrer design

RESEARCH FELLOW, CENTRE FOR MINERALS RESEARCH, DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSITY OF CAPE TOWN, SOUTH AFRICA

2016-2018, 2020-2021

The University of Cape Town (UCT) is a public research university located in Cape Town in the Western Cape province of South Africa.

Research Fellow | Energy Research Data Analyst

- Prepared granular flow models for efficient use of energy in comminution circuit for applied physics group at Centre for Mineral Research.
- I employed Positron Emission Particle Tracking (PEPT) to create empirical models to assess process control in comminution circuit.
- Designed mechanistic granular rheology prototype to study regular & shear stress in tumbling mill.
- Used positron emission particle tracking (PEPT), DEM & CFD to analyse granular flow in various geometries employed in minerals processing. Worked with a team of young engineers to develop bio-diesel plant with waste vegetable oil.
- Employed CFD to simulate & design bio-gas production from cow dungs in dairy farm resulting in off grid sustainable electricity generation from biodigester. Tutored physics & engineering students in applied physics in electronics & engineering.
- I studied energy demand side modelling & data optimization in Energy Modelling Group, Energy Research Centre.
- Developed skills in energy system analysis & integrated energy modelling Research on different renewable energy technologies & their appropriate integration. Carried out Solar PV load calculation & system design (both hybrid & standalone
- Mapped solar direct normal irradiance (DNI) for possible CSP site including researching future CSP contributions to regional energy mix based on multiple economic growth factors & used as reference for many solar thermal energy works.
- Collaborated with Engineers without Borders to devise energy efficient stoves for meat & millet vendors in local communities aimed at decreasing energy poverty among women living in townships & reduce health hazards related to wood energy.

UNIVERSITY OF ABUJA, NIGERIA

2008-2009

The University of Abuja is a tertiary institution in the Nigerian capital, Abuja.

Research Lecturer

- Led physics laboratory activities & technical marking of practical reports for students each semester.
- Restructured laboratory procedures to accommodate effective teaching & student participation & engagement.

- Innovated methods to conduct lab work by teaching students pragmatic approach providing insight into difficult theoretical problems & helping appreciate practical applications of natural science.

EDUCATION & CERTIFICATES

UNIVERSITY OF CAPE TOWN, SOUTH AFRICA

Ph.D. Chemical Engineering (Mineral Processing), 2017

UNIVERSITY OF CAPE TOWN, SOUTH AFRICA,

Master of Science in Engineering (MSc Eng.), Energy & Developmental Studies, 2011

BOWEN UNIVERSITY IWO, NIGERIA

Bachelor of Science (Honours) in Physics & Solar Energy, 2008

AWARDS

2017: Australian Post-Doctoral Award for outstanding African scholars by Australian government.

2017: KAREMA Fellow, Germany Kaiserslautern Research Matching for first class scientist funding.

2013-2017: National Research Fund (NRF), grant-holder-linked doctoral bursary (award).

2013-2014: International Student Scholarship, University of Cape Town.

2013-2015: South African Minerals to Metals Research Institute (SAMMRI) Scholarship, UCT & research grant supporting PhD research.

TECHNICAL SKILLS

DEM Modelling, Microsoft Office Suite. MATLAB, FORTRAN, Python, EDEM, Rocky, StarCCM+, Ansys Fluent, OpenFoam, JKSImMet & IES

RESEARCH GRANTS

P3-007 Validation of mass balance & model calibration in IES (P9Q AR) (2019–2020) Cooperative Research Centre for Optimizing Resource Extraction Ltd.

DEM Modelling of stirred mill prototype & alternative stirrer designs (2018) Weir Minerals Australia Ltd.

SELECTED PUBLICATIONS

- Enemu, M., & **Ogunmodimu, O.** (2025). Transitioning the mining sector: A review of renewable energy integration and carbon footprint reduction strategies. *Applied Energy*, 384, 125484.
- Enemu, M., Darlington, A., & **Ogunmodimu, O.** (2024). Carbon nanotubes (CNTs) and graphene oxide (GO) hybrid enhanced canola protein isolate (CPI) bioadhesive for interior wood applications. *Chemical Engineering Communications*, 1-18.
- **Ogunmodimu, O.**, Weatherley, D.K, and Powell, M.S. Traversing a tumbling mill: an ore particle's perspective. *Proc. XXX International minerals processing congress, Cape Town, South Africa; 2020 pp.478-492*

- **Ogunmodimu, O.O.S., Mainza, A.N., Govender, I. and Franzidis, J.P., 2025. Granular flow dynamics on vibrating screens: A mechanistic study. Minerals Engineering, 228, p.109337.**
 - **Ogunmodimu, O., Govender, I., Mainza, A.N. and Franzidis, J.P., 2021. Development of a mechanistic model of granular flow on vibrating screens. Minerals Engineering, 163, p.106771.**
 - **Ogunmodimu, O. & Okoroigwe, E.C., 2019. Solar thermal electricity in Nigeria: Prospects & challenges. Energy policy, 128, pp.440-448**
 - **Ogunmodimu, O. & Okoroigwe, E.C., 2018. Concentrating solar power technologies for solar thermal grid electricity in Nigeria: A review. Renewable & Sustainable Energy Reviews, 90, pp.104-119**
 - **Ogunmodimu, O.O., 2012. Potential contribution of solar thermal power to electricity supply in Northern Nigeria (Master dissertation, University of Cape Town)**
 - **Ogunmodimu, O.O., 2013. CSP technology & its potential contribution to electricity supply in northern Nigeria. International Journal of Renewable Energy Research (IJRER), 3(3), pp.529-537**
 - **Ogunmodimu, O., Govender, I., Mainza, A. & Franzidis, J.P., 2016, August. The Development of a Simplified System for Measuring the Passage of Particles on & Through Moving Screen Surfaces Using DEM. In International Conference on Discrete Element Methods (pp. 709-721). Springer, Singapore**
 - **Ogunmodimu, O., 2016. Developing a mechanistic model for flow through a perforated plate with application to screening of particulate materials (Doctoral dissertation, University of Cape Town)**
 - **Ogunmodimu, O., Govender, I., Mainza, A. & Franzidis, J.P., 2017, September. Using Discrete Element Method (DEM) to test the granular flow modelling for inclined vibrating screens. European Symposium on Comminution & Classification. Izmir, Turkey**
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