# Olaleru Solomon Akin

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## CAREER OBJECTIVE

To advance Physics education through AI-enhanced teaching while conducting solution-driven research in Condensed Matter Physics and Materials Science, focused on low-cost, high-efficiency photovoltaic and optoelectronic devices using nanoscale materials. Committed to contributing to responsible AI governance through interdisciplinary research, ethical risk assessment, and policy-informed solutions that promote sustainable development and inclusive innovation in Africa.

## SKILLS AND COMPETENCIES

- **Perovskite Solar Cell Fabrication:** Spin-coating, slot-die coating, green solvent processing.
- **Materials Characterization:** XRD, SEM, AFM, UV–Vis spectroscopy, I–V testing, EQE analysis.
- **Thin-Film & Device Engineering:** Optimization, stability analysis, and scale-up for large-area devices.
- **Artificial Intelligence & Data Analysis:** AI-Accelerated materials discovery, device modeling, and performance optimization; proficiency in OriginPro, EC-Lab, and scientific data analysis.
- **Computational & Device Modelling:** Physics-based modelling of optoelectronic devices and data-driven simulation approaches.
- **Research & Innovation:** Scientific writing, peer-reviewed publications, and collaborative research development.
- **Leadership & Project Management:** Team coordination, supervision, grant writing, and technical reporting.

## EDUCATION

**Ph.D., Physics**, University of Venda, South Africa **2020**
Thesis: Metal oxide nanostructures and hybrid perovskite semiconductor for photovoltaic application

**M.Sc., Physics**, University of Lagos, Nigeria **2011**

**B.Sc., Physics**, Lagos state university, Nigeria **2004**

## RELEVANT EXPERIENCE

**Senior Lecturer & Researcher** – Yaba College of Technology, Nigeria (Year–Present)

- Lead applied research in **perovskite photovoltaic devices** and nanomaterial development.
- Develop and supervise laboratory experiments in thin-film deposition and solar cell characterization.

- Mentor undergraduate and postgraduate students in renewable energy projects.
- Collaborate with local and international research networks to drive solar innovation in Nigeria.

**Doctoral Researcher** – University of Venda, South Africa (2016–2020)

- Investigated hybrid perovskite semiconductors for solar energy applications.
- Explored metal oxide nanostructures to improve optical absorption and charge transport.
- Designed fabrication protocols for perovskite solar cells with enhanced efficiency and stability.
- Applied advanced characterization techniques (XRD, SEM, AFM, UV-Vis) to correlate microstructural properties with device performance.

## PUBLISHED PAPERS

IP Ejidike, OS Okoh, TO Fakoya, SA Olaleru…Metal Oxide Nanocatalysts for Water Purification Processes- Metal Oxide Nanocatalysts for Sustainable Energy …, 2026

O Adekoya, S Olaleru, M Solomon, K Adewoyin. A Short-term Performance monitoring and evaluation of a photovoltaic system at yaba college of technology using a data logger - FULafia Journal of Science and Technology, 2026.

O Oyebamiji, M Ilori, O Amund, S Olaleru. Biochemical characterization of indigenous green microalgae and FAMEs profiling of lipids for sustainable biodiesel production, W Boeing - EPJ Web of Conferences, 2026

NF Afuwape, NE Erusiafe, OO Oyebola, I Humphrey… Optimizing Bioethanol Production from Elephant grass (Pennisetum purpureum) Using Lime-Buffered Fermentation and Gompertz Kinetic Modeling - Journal of Renewable Energy and Environment, 2026

Josiah Owolabi, Ojonugwa James, Wanita Okoronkwo, Ruth F. Lawal, Janet I. Owolabi, Omowumi A. Olowa, Akin Olaleru. Assessment of perception, intention and challenges in the utilization of ai for learning among basic school students in fct, Abuja. Fudma journal of educational research (fudjer) 2025

Optimizing bioethanol production from Elephant grass (Pennisetum purpureum) Using Lime-Buffered fermentation and Gompertz Kinetic Modelling
NF Afuwape, NE Erusiafe, I Humphrey, IP Ejidike… SA Olaleru - Journal of Renewable Energy and Environment, 2025

An optimal method for preparing perovskite crystals and thin films for smart optoelectronic devices and applications. *Discov Mater* **5**, 37 (2025)

Hybrid Perovskite Solar Cells: A Disruptive Technology for Hydrogen Production through Photocatalytic Water Splitting. ChemistryOpen 2025,

Photovoltaic performance of semi-pure and crude dye extracts from the leaf of *Lonchocarpus cyanescens* as natural sensitizer for DSSC. Next Energy Volume 9, October 2025, 100386

Enhanced photocatalytic degradation of methylene blue dye using TiO2 nanoparticles obtained via chemical and green synthesis: a comparative analysis. SA Olaleru, MI Molokwu, S Mathew, IP Ejidike… - Pure and Applied Chemistry, 2025

Recent Advancements of Niobium and Tantalum-Based Materials: From Design Engineering to Energy Storage Applications YS Worku, LL Sikeyi, AS Olaleru, TH Dolla… - ChemistrySelect, 2025

Unveiling the Influence of Annealing Temperature on Properties of CZTSSe Nanocrystals A Olaleru, A Olasoji, A Kehinde, M Solomon… - Advanced Physics Research, 2025

Enhanced Photoelectrochemical Activity of Green-Capped TiO2 Photoelectrodes for DSSC Application MO John, TB Ogunbayo, IP Ejidike, C Isanbor…SA Olaleru - ChemistrySelect, 2025

Green synthesis and characterization of bioinspired metal nanoparticles mediated by Ipomoea involucrata P. Beauv. as potential antimicrobial agents, IP Ejidike, DO Seyinde, CF Nwaeme, MO Bamigboye… - International Journal of Nanoscience and …, 2024

Worku YS, Sikeyi LL, Olaleru SA, Palaniyandy N, Mathe MM and Srinivasu VV (2024) Using Nanomaterials to Make Better Batteries. Front. Young Minds. 12:1349295. doi: 10.3389/frym.2024.1349295

Biofabrication, spectroscopic, and photocatalytic studies of titania nanoparticles mediated by Proteus mirabilis strain NG-ABK-32 for smart applications. Scholastica N. Dimo, Olayide F. Obid, Ayorinde O. Nejo, Solomon A. Olaleru, Ikechukwu P. Ejidike & Ademola J. Adetona. Smart Science Published online: 10 Apr 2024

Trans-purification of spent carbide via pressure pot into reusable limes: An economical approach. K. F. K. Oyedeko, O. P. Akinyemi, O. I. Ogunyemi, S. A. Olaleru, M. S. Rickette, I. P. Ejidike. Journal of Applied Research and T echnology 21 (2023) 945-951

Biosynthesis, Characterization, and Antimicrobial Assessment of Metal Nanoparticles from Dryopteris manniana (HOOK.) C. Chr Leaf Extract Ikechukwu Ejidike, Racheal U. Ijimdiyaa, Hilda A. Emmanuel-Akerele, Godsglory C. Emmanuel, Obiamaka M. Ejidike, Mercy O. Bamigboye, Doris O. Seyinde, Akin Olaleru, Williams O. Tanimowo, Racheal O. Awolope. Pharmaceutical Sciences. Bull. Pharm. Sci., Assiut University, Vol. 46, Issue 1, 2023, pp. 225-238

Elucidating the Trajectory of the Charge Transfer Mechanism and Recombination Process of Hybrid Perovskite Solar Cells. Joseph K Kirui, Solomon Akin Olaleru, Lordwell Jhamba, Daniel Wamwangi, Kittessa Roro, Adam Shnier, Rudolph Erasmus, Bonex Mwakikunga . *Materials* **2021**, *14*(11), 2698

Green Technology: Solution to Global Climate Change Mitigation. SA Olaleru, JK Kirui, FI Elegbeleye, TE Aniyikaiye. Energy, Environment and Storage (2021) 01-01-26-41

Enhanced optical properties of perovskite thin film through material optimization for photovoltaic application. **SA Olaleru**, JK Kirui, D Wamwangi, L Jhamba, R Erasmus, B Mwakikunga, K Roro. E3S Web of Conferences **239**, 00020 (2021) *ICREN 2020*

Perovskite solar cells: The new epoch in photovoltaics
**SA Olaleru**, JK Kirui, D Wamwangi, KT Roro, B Mwakikunga Solar Energy 2020 196, 295-309

The impact of synthesis techniques on the properties of hybrid perovskite materials for photovoltaic application
**SA Olaleru**, D Wamwangi, JK Kirui, KT Roro, B Mwakikunga, Nithyadharseni Palaniyandy, Naheed El-Mahallawy, Mohammed Rashad, Materials Express 2020 10 (7), 1127-1134

Physico-Chemical Properties, Heavy Metal Content and Radioactivity Levels in Soils around a Cement Production Facility in Ogun State, Nigeria., Jordan J. Phys., 15 (5) (2022) 519-526.

## PUBLISHED BOOK CHAPTERS

New electrolytes formulation for electrochemical energy devices D Lakshmi, MI Diana, SA Olaleru, N Palaniyandy - Advanced Electrochemical Materials and Devices for …, 2025

Revolutionary hybrid supercapacitor-batteries—High energy and high-power energy devices .YS Worku, LL Sikeyi, SA Olaleru, MM Mathe… - Advanced Electrochemical Materials and Devices for …, 2025

Hybrid Perovskite Thin Film, chapter in the Intech Open Access book. “Thin Films Photovoltaics”. ISBN: 978-1-83969-906-1. 2022

Optimal conditions for preparation of perovskite materials for optoelectronic devices in the Intech Open Access book. ISBN: 978-1-80355-319-1. 2022

Oral presentation of paper entitled "The Digital Trap: Modern Digital Tools and Their Influence on Students' Creativity". Paper presented at 1ST Annual General Conference of Association of cybersecurity practitioners (ACSP) 24TH-27TH March,2026

Workshop on Mastering University rankings for global visibility at Virtual Institute for Capacity Building in Higher Education (VICBHE), February 17 to March 31, 2026, Nigeria

Workshop on Mastering Digital Survey Tools for Research and Evidence-Based Decision Making at Virtual Institute for Capacity Building in Higher Education (VICBHE), November 1 to December 13, 2025, Nigeria.

Oral presentation of paper entitled "Communication and Integrity: Safeguarding academic standards in the artificial intelligence (AI) Era". Paper presented at 12TH LSME international research conference on "responsible research and innovation in humanities and social sciences 29th - 30th October 2025

Workshop on Proficiency in Cybersecurity at Virtual Institute for Capacity Building in Higher Education (VICBHE), April 28 to July 15, 2025, Nigeria.

Workshop on Writing Grant winning Proposal and Fundraising at Virtual Institute for Capacity Building in Higher Education (VICBHE), August 4 to October 18, 2024, Nigeria.

NOUN-Notre Dame Online Training Course and Research Project on *Ethics and Sustainability of Artificial Intelligence for Nigerian Higher Education Lecturers*. Monday, 8th July 2024, and run through Friday, 30th August 2024.

Workshop on Artificial Intelligence (AI) at Virtual Institute for Capacity Building in Higher Education (VICBHE), January 22 to April 26, 2024, Nigeria.

Oral presentation of paper entitled "Optimal conditions for preparation of perovskite crystals and thin film". Paper presented at Virtual Conference on Chemistry and its Applications 8 th to 12 th August 2022.

Poster presentation of paper entitled "Optimal conditions for preparation of perovskite crystals and thin film". Paper presented at African Light Source (AfLS3 – 2021) Pan-African Conference on Crystallography online (ePCCr - 2021) African Physical Society (AfPS – 2021) From 15th – 19th November 2021.

Oral presentation of paper entitled "Charge Transfer Mechanism and Recombination Process of Hybrid Perovskite Solar Cells" Paper presented at the 2021 Annual South African Institute of Physics at the North-West University, Thursday 22 July 2021 - Friday 30 July 2021.

Oral presentation of paper entitled "Green Nanotechnology: Taking the lead for sustainable environment". Paper presented at the International Conference on Energy, Environment and Storage of Energy, ICEESEN 19-21 November 2020 Kayseri, Turkey

Oral presentation of paper entitled "Effect of synthesis Approach on the structural and optical properties of hybrid perovskite materials for photovoltaic Application." Paper presented at the 1st International Conference on Nanotechnology: Theory and Applications Cairo – Egypt, December 10th - 13th 2018.

Oral presentation of paper entitled "Characterisation of the optical properties of silver." Paper presented at the 2017 annual South African Institute of Physics at the University of Stellenbosch from 9th July to 13th July 2017.
Attended the 6$^{Th}$ CSIR Conference at Pretoria, South Africa from 5-6 October 2017.

Active learning in Optics and Photonics' workshop held at University of Lagos. April 2016.

School of Science International Scientific Conference, Yaba College of Technology, Yaba Lagos. June 2020.

Round Table Discussion, Grooming the Next Generation Scientist in Nigeria: Proven Strategies used in Nigeria and United States at MPR, PAS, US Consulate General Lagos. November 2012

## SERVICE AND ACTIVITY

Community Engagement Project: SAIP-Limpopo Vhembe District Online Teacher Training Facilitators September 2020

Community Engagement Project: SAIP-Limpopo Vhembe Teacher Development Training Facilitator 2018

General Coordinator, Deeper Life Campus Fellowship, University of Venda Chapter, South Africa 2016-2020

## PROFESSIONAL MEMBERSHIP

National Association of Artificial Intelligence Practitioners (NAAIP) Till date

South African Institute of Physics (July 2016 – date)

Member, Nigeria Institute of Physics (November 2011- Date)

Member, Material Science of Nigeria 2015

Member, Society for Environmental Toxicology and Pollution Mitigation (SETPOM) (2013 –Till date)

## TEACHING & SUPERVISION EXPERIENCE

**University of Venda:** 2016-2019
* General Physics
* Practical Class Year one and Two
* Third year experiment
* Modern physics

**Yaba College of Technology:** 2006-Present
* Mechanics
* Electromagnetism
* Optics and Waves
* Modern Physics
* Structure of Matter
*Electricity and Magnetism
*Quantum Physics
*Material Science

**Courses Taught at University of Nigeria, UNN Nsukka affiliated to Yabatech**
*Mechanics (First year University)
*Quantum Physics (Final year University)
*Solid State Physics (Final year University)

Assist in supervising Honours and Masters Projects
Supervision of Higher National Diploma Projects/ Bachelor of Science

## TECHNICAL SKILLS

- **Thin-Film Fabrication:** Spin-coating, slot-die coating.
- **Device Performance Analysis:** I–V curve tracing, EQE analysis, and stability testing.
- **Materials Characterization:** XRD, SEM, AFM, UV–Vis spectroscopy, TGA.
- **Artificial Intelligence & Data Analysis:** AI for materials discovery, device performance prediction, and optimization; data-driven analysis and modeling.
- **Computational Tools:** EC-Lab, OriginPro, and AI-enabled scientific data analysis tools.

## RESEARCH INTEREST

1. **AI-Driven Synthesis and Application of Nanomaterials:** Hybrid perovskites and nanoscale materials for advanced energy applications.
2. **Artificial Intelligence in Organic Photovoltaics (OPVs):** Data-driven design, modeling, and performance optimization.

3. **Renewable Energy Systems:** AI-enabled solutions for sustainable and efficient energy generation.
4. **Perovskite Solar Cells:** AI–assisted stability enhancement, scalability, and efficiency optimization.
5. **Optoelectronic Devices:** AI-guided design, simulation, and characterization of next-generation devices.

## RESEARCH INSTITUTIONS AFFILIATION

University of South Africa (**UNISA**), Johannesburg, South Africa

University of the Witwatersrand (Wits), Johannesburg, South Africa

Centre for Scientific and Industrial Research (CSIR), Pretoria, South Africa

**HOBBIES:** Reading inspirational books & listening to music

## AWARDS & GRANTS

Integrated Aquaponics System for Sustainable Catfish Production and Dual-Crop Cultivation of Leafy Vegetables and Corn: Optimizing Nutrient Cycling and Yield Efficiency (2025 Incitis Food Europe Horizon Grant for €100,000)

Fabrication and Optimization of Hybrid Perovskite Semiconductors for High-Efficiency Photovoltaic Devices (2025 TETFund NRF for N38,500,000)

Optical properties and photocatalytic performance of *Moringa oleifera* leaf and seed extracts as sensitizers in organic solar cells (2024 TETFund IBR for N5,000,000)

Performance monitoring and evaluation of photovoltaic system using curve tracer and data logger (2024 TETFund IBR for N5,000,000)

Best Postal award at Pan-African Conference on Crystallography online (ePCCr - 2021) African Physical Society (AfPS – 2021) November 2021.

Reviewer, The IntechOpen Book chapter “Encapsulation of Perovskite Solar Cells with Thin Barrier Films”.

Virtual Peer Review Panels.
Main activities and responsibilities: NRF scholarships application reviewer, SA-JINR scholarships applications reviewer, and monthly board reviewer meeting.

## SCIENTIFIC VISIBILITY

Google Scholar: https://scholar.google.com/citations?user=l8HJPboAAAAJ&hl=en
ORCID: https://orcid.org/0000-0002-5621-8020

ResearchGate: https://www.researchgate.net/profile/Akin-Olaleru-2?ev=hdr_xprf
www.linkedin.com/in/akin-olaleru-ph-d-a884619b

## REFERENCES

**Prof. JK Kirui**
**(Ph.D Supervisor)**
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E-mail: Joseph.Kirui@univen.ac.za

**Dr. K Roro**
**(Ph.D Co-supervisor)**
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