Taiwo Zacchaeus Adesanya

Chemical Engineer | Material Scientist | Computational Chemist
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SUMMARY

Innovative researcher with expertise in materials science, polymers, & sustainable energy solutions, combining experimental research with computational modelling (DFT, MD, ML) to accelerate R&D for products & processes that improve the quality of life at an affordable cost while protecting the planet.

EDUCATION

University of Illinois Chicago, Chicago, IL **Dec. 2026**
Doctor of Philosophy, Chemical Engineering
University of Illinois Chicago, Chicago, IL **Dec. 2024**
Master of Science, Chemical Engineering
University of Lagos, Akoka, Lagos, Nigeria **Apr. 2014**
Bachelor of Science, Chemical Engineering

TECHNICAL SKILLS

Analytical Skills: *NMR, FTIR, UVvis, SEM, TGA, GC/MS, HPLC, DLS, GPC, Mechanical Testing, XRD, rheology, DNA extraction & sequencing*
Computational skills: *Density functional theory (DFT) with ORCA, AMS Suite, Gaussian09, Process Simulation with Aspen Hysys & Plus, Python for data analysis and machine learning, OriginPro, Molecular Dynamics with GROMACS & LAMMPS, Adobe Illustrator, AutoCAD, Microsoft Office Suite, technoeconomic analysis, and lifecycle assessment.*

EMPLOYMENT

University of Illinois Chicago, Department of Chemical Engineering **Aug. 2022 – Dec. 2025**
PhD Candidate PhD Advisor: *Dr Ezinne C. Achinivu-Ibagere*
PhD Dissertation Title: *Molecular Design of Sustainable Lignin-Based Advanced Materials*

- Correlated effect of lignin structure on bioplastic performance. Discovered *Mischantus* lignin's ability to achieve 99% UV-blocking, 41% elongation and 32% improved moisture barrier compared to cellulose bioplastics and biodegradation within 28 days.
- Implemented material informatics to screen plasticizers for cellulose-based bioplastics.
- Developed novel models of ionicity for protic ionic liquids where classical predictors fail.
- Screened over >5M ionic liquids for interaction with enzymes, accelerating one-pot processing and reducing the footprint of processing plants.
- Developed a data pipeline for solvent effects on nanoparticle synthesis & biopolymer dissolution, reducing the number of experiments required to select suitable solvents.

***AMG Integrated Service Nigeria Ltd.**, V. I. Lagos, Nigeria* **July 2019 – July 2022** Process and Project Engineer

- Design of a modular gas processing plant & a crude oil refinery in Nigeria. These efforts led to a **28% reduction** in Project CAPEX & **15% increase** in revenue for the gas plant.
- Executed flow assurance studies, Hazardous Operability (HAZOP) Studies, etc., that secured the regulatory approvals for the construction of the gas plant.
- Engaged technical, commercial, financial, & legal partners to raise $40M CAPEX

***Kainos Exploration and Production Nig. Ltd.,** Lekki Lagos, Nigeria* **Jan.2018 – May 2019** Process and Project Engineer

- Supported reentry & engineering of offshore facilities to produce 5,000 bopd of crude oil.

***Sigmund Engineering Works Ltd**, Lekki, Lagos Nigeria* **Aug. – Dec. 2017** Project Coordinator

- Created economic value & minimized pollution with emergency repairs of the Nembe Creek Truckline (OML 29) pipeline vandalism to transport 150,000 bopd of crude oil.

Spunt Innovatia Services, Lagos, Nigeria **Sept. 2015 – July 2017**
Process Design Engineer

- Process simulation of chemical processing facilities for industrial and academic clients
- Developed and delivered engineering software (Hysys, Matlab, AutoCAD) training content to **~500 students and 20 lecturers** across Nigeria.

HONORS & AWARDS

- NOBCChE ASCG Tier 1 Award **Sept. 2025**
- 2nd Place, Poster Competition, AIChE Midwest Regional Conference **Apr. 2025**
- Best Performing Staff of the Month – March 2018, Kainos E &P Nig. Ltd. **Mar. 2018**
- Best Undergraduate Plant Design Project, NSChE Annual Meeting **Nov. 2014**

SELECTED LEADERSHIP & VOLUNTEERING

- President, Chemical Engineering Grad. Student Ass. (ChEGSA) at UIC **2025-26**
- Board Secretary, Mademoiselle Reformation Foundation, Nigeria **2008-12**
- Senior Perfect, Ogudu Grammar School **2007-08**
- Senior Perfect, Arowosegbe Primary School **2001-02**

SELECTED RESEARCH PRESENTATIONS

- AIChE Annual Meeting **Nov 2025**
  "*Screening of Plasticizers for Bioplastics*" (Invited Talks); *Molecular Design of Sustainable Lignin-Based Advanced Materials* (Poster); *"Effects of lignin structure on the performance of Cellulose-Lignin biodegradable films* (Oral)" and *"Mechanistic insights into the Structure-Property Relationships of lignin-based bioplastics* (Poster)"
- AIChE Annual Meeting **Oct. 2024**
  Dynamics of Cellulose & Lignin during Solution Blending (Poster)
- American Chemical Society Spring **April 2024**
  Biodegradation & thermal decomposition kinetics of sustainable high-performing cellulose-lignin films (Oral)
- Gordon Research Conference **May 2023**
  Cellulose-Lignin Biodegradable Films Alternative for Single-use Plastics: Formulation Optimization and Performance Assessment (Oral & Poster)

PUBLICATIONS

T.Z. Adesanya, J. Fajardo,…, E. Ibagere, High-performance biobased packaging: Ionic liquid-assisted cellulose-lignin bioplastics as sustainable alternatives to LDPE, Chem. Eng. J. 529 (2026) 173080. https://doi.org/10.1016/j.cej.2026.173080.

E. Achinivu-Ibagere, **T.Z. Adesanya,** V. Larzilliere, E.C. Rivera, F. Allais, Charge-mediated nano-filtration for recovering sinapic acid from a mustard bran hydrolysate, J. Membr. Sci. 713 (2025) 123333. https://doi.org/10.1016/j.memsci.2024.123333.

O.D. Saliu, **T.Z. Adesanya**,…, E. Achinivu-Ibagere, Transformation of Sugar Cane Lignin into Renewable Fuel-Range Cyclo-Alkanes: In-Situ Hydrogen Release Using Earth-Abundant AlCl3 and Biobased Mannose Triflate Support, Ind. Eng. Chem. Res. 64 (2025) 179–189. https://doi.org/10.1021/acs.iecr.4c03341.

G. Umenweke, **Z. Adesanya**, H. Onyeaka, T. Miri, Modular bio-refinery simulation of Nesogordonia papaverifera by fast pyrolysis (FP): a focus on bio-oil enhancement, Biomass Convers. Biorefinery 13 (2023) 2655–2665. https://doi.org/10.1007/s13399-021-01430-z.

E. Fidelis Wilson, A. Joseph Taiwo, …, **Z. Adesanya**, A Review on the Use of Natural Gas Purification Processes to Enhance Natural Gas Utilization, Int. J. Oil Gas Coal Eng. (2023). https://doi.org/10.11648/j.ogce.20231101.13.