Samuel A. Fagbemi

https://www.samuelfagbemi.com https://github.com/anufagbemi samkorede24@gmail.com

Guest Editor: *Sustainable Development in Functional Biomaterials: Coating Methods and Optimization*.
Postdoctoral Research Associate: *Multiscale Materials Group*,
Oak Ridge National Laboratory, 1 Bethel Valley Rd, Oak Ridge TN 37830.

EDUCATION

***Ph.D.*, Petroleum Engineering** – University of Wyoming (2020)
***MS*., Petroleum Engineering** – University of Southern California (2013)
***BS*., Mechanical Engineering** – Kwame Nkrumah University of Technology, Ghana (2010)

PROFESSIONAL EXPERIENCE

Postdoctoral Research Associate: *Oak Ridge National Laboratory, Oak Ridge, TN* (Feb. '24 –)

- Joule heating – pulsed heating and quenching modeling in catalytic reactors.
- Electro-kinetics and transport phenomena study in complex porous media.
- Analysis of large linear systems from implicit SBP-SAT Finite Difference Methods using Multi-GPU parallelization

President's Postdoctoral Fellow: *C/C++, – Georgia Tech, Atlanta GA* (Aug. '22 –Jan. '24)

- Design and manufacture of sustainable packaging materials using multilayer slot die coating.
- Micro-continuum modeling of shear-thinning fluid coating during roll-to-roll manufacturing.
- Multiphase coupling of fluid flow in free-flow and porous regions with moving porous baffles.
- Modeling of operating limits of single-layer and multilayer coating of Newtonian and non-Newtonian fluids during slot die coating.

Software Developer/ Sr. Research Scientist: *Python, C/C++, – Center of Innovation for Flow through Porous Media (COIFPM),* Fort Collins, CO (Aug.'20 – Jul. '22)

- Backend software developer of advanced imaging software program for oil and gas industries.
- Developing a hybrid multi-scale image processing system coupled with artificial intelligence (AI) to tackle uncertainties in Darcy-based simulators arising from restrictive computational domain sizes, and the lack of small-scale heterogeneity.
- 3D image super-resolution and segmentation of grayscale image stack using Machine learning (ML) and applying peak signal-to-noise ratio (PSNR), structural similarity index (SSIM), Euler number, and petrophysical parameters as quality metrics.
- Development of efficient GPU-based parallel linear system for analyzing large matrices.
- Strong scaling analysis of large linear systems using PETSC, KOKKOS, AmgX solvers on DGX-Station.
- Application of Multi-Process Service (MPS) server at the interface between GPUs and MPI processes for better communication management between them.
- Creating hardware system roadmap to be utilized by multidisciplinary research groups.

Research Assistant *Department of Energy (DOE)* (Oct. '19 – Aug. '20)

- Petrophysical property estimation and transport simulation on middle Bakken tight reservoir rocks.
- Machine learning application for predicting petrophysical property.

Research Assistant: *Energy & Petroleum Engineering,* University of Wyoming (Jan. '17 – Jul. '20)

- Modeling two-way interaction of hydrodynamic and mechanical stresses in complex porous media, microfluidic devices and microchannels using Fluid-Structure Interaction (FSI) approach.

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- Prediction of fluid occupancy of multiphase fluids and stress-dependent permeability of solid matrices using novel fully coupled pore-network and finite element model with convex hull.
- Development of multiphase resolved and unresolved CFD-DEM software for saturated systems.

Lecturer *Department of Energy and Petroleum Engineering,* University of Wyoming, Laramie WY

- Introduction to computing, PETE 2020 (Fall '19)
- Well testing, PETE 4225 (Teaching Assistant) (Fall '17)
- Dynamics, PETE 2050 (Summer. '17)

Graduate Assistant *Department of Mech. Engineering*, Texas A&M – Kingsville (Aug.'16 – Dec. '16)

- Design and manufacture of pleated rubber muscle actuators (RMAs).
- 3D printing of RMAs in a Connex 3D printer.
- Fiber-reinforced plastic design and manufacture.
- Teaching student lab classes.

Intern *ExxonMobil, Mobil Producing Nigeria (MPN),* Ibeno Akwa-Ibom, Nigeria (May'08–Aug. '09)

- Preventive and reactive maintenance of triplex positive-displacement and centrifugal pumps.
- Extensive brainstorming, failure evaluation, rebuilding & replacement of pump hardware.
- Maintained meticulous records of scheduled maintenance, and upcoming projects.
- Real-time monitoring of NGL production on $1.3bn platform: first of its type in W. Africa.
- Performed daily preventive maintenance on 18,000-tonne gas compression facility and turbines.
- Analyzed P&IDs, technical drawings, schematics and computer-generated reports.
- Utilized effective system infrastructure, data management and interpretation techniques for achieving flow control, monitoring, and optimization of the facility.

PUBLICATIONS

D. Ojemuyiwa, **S. Fagbemi** (2024) Human Evolution As We Know It. ESS Open Archive, DOI: 10.22541/essoar.173282394.46098553/v1

Y. Wu, P. Tahmasebi, K. Liu, C. Lin, S. Kamrava, S. Liu, **S. Fagbemi**, C. Liu, R. Chai, S. An, (2023). Modeling the Physical Properties of Hydrate-Bearing Sediments: Considering the Effects of Occurrence Patterns; *Energy, 278, 127674.*

T. Ogundare, **S. Fagbemi**, (2022). Tubular Lockup Prediction in Deviated Wells Using Markov Chains. In International Conference on Offshore Mechanics and Arctic Engineering (Vol. 86328, p. V001T02A002). *American Society of Mechanical Engineers*.

Y. Wu, C. Lin, **S. Fagbemi**, P. Tahmasebi, S. An, K. Liu (2022); Two-phase Flow Simulation of Oil and Water and Analysis of Microscopic Remaining Oil Based on Multiscale Digital Cores; *International Journal of Heat and Mass Transfer, 194, 123080.*

T. Davydzenka, **S. Fagbemi**, P. Tahmasebi (2020); Coupled Fine-Scale Modeling of the Wettability Effects: Deformation and Fracturing; *Physics of Fluids 32 (8), 083308.*

T. Davydzenka, **S. Fagbemi**, P. Tahmasebi (2020); Wettability Control on Deformation: A Coupled Multiphase Fluid and Granular System; *Physical Review E 102 (1), 013301.*

S. Fagbemi, P. Tahmasebi, and M. Piri (2020); Elastocapillarity Modeling of Multiphase Flow-Induced Solid Deformation using Volume of Fluid Method*; Journal of Computational Physics 421 (2020): 109641*.

S. Fagbemi, P. Tahmasebi (2020). Coupling pore network and finite element methods for rapid modeling of deformation. *Journal of Fluid Mechanics*, 897, A20.

S. Fagbemi, P. Tahmasebi, and M. Piri (2020). Strongly coupled Multiphase Flow-induced solid deformation using Finite Volume Method. *International Journal for Numerical and Analytical Methods in Geomechanics.*, Volume 44, Issue 2.

S. Fagbemi, P. Tahmasebi, M. Piri (2018). Pore-scale Modeling of Multiphase Flow through Porous Media under Triaxial Stress. *Advances in Water Resources*, 122: 206-216.

S. Fagbemi, P. Tahmasebi, and M. Piri (2018). Interaction between fluid and porous media with complex geometries: A direct pore-scale study. *Water Resources Research*, 54: 6336–6356.

Conference Papers

S. Hong, F. Posada, **S. Fagbemi** (2024), Curriculum enhancement of the Parallel Computing course at Jackson State University, Gateways 24, Faculty Hackathon *(poster)*.

S. Fagbemi, J. Rhone, J. Meredith, M. Shofner, S. Vuong, B. Einsla, M. L. Einsla, J. Accardo, M. A. Upshur, T. A. L. Harris (2024), Roll-to-roll processing of sustainable packaging materials using modified biopolymers. ACS Fall Meeting SciMeetings, Denver, CO, Aug. 18-22

T. Ogundare, **S. Fagbemi**, (2022). Tubular Lockup Prediction in Deviated Wells Using Markov Chains. In International Conference on Offshore Mechanics and Arctic Engineering (Vol. 86328, p. V001T02A002). *American Society of Mechanical Engineers*.

Journal Manuscripts in Preparation

S. Fagbemi, Y. Ji, J. Rhone, J. C. Meredith, M. Shofner, T. Harris, (2025), Renewable Barrier Multi-layer Coating of Porous Packaging Materials, *Advanced Functional Materials (under review)*.

S. Fagbemi, O. Elagab, Z. Qin, B. McCaskill, Y. Gong, J, Eyram, M. Piri (2025), Characterization of Core-Sized Rock Samples Using Hybrid Multi-Scale Image Analysis and Machine Learning, *Nature Communications (under review)*.

S. Fagbemi, V. Ramanuj, M. Saffarini, P. Roth, R. Sankaran, D. Scholl, (2025), Joule Heating in Fibrous Media at Pore-scale Using a Sharp Interface Level-set Method *(under prep)*.

O. Elagab, Z. Qin, **S. Fagbemi**, M. Piri (2025), Multi-scale Imaging and analysis of Bentheimer and Berea sandstones *(under prep)*.

S. Fagbemi, T. Harris (2025), Multiscale Simulation of Multi-Layer Coating Using Darcy-Brinkmann-Biot Approach *(under prep)*.

S. Fagbemi, J. Rhone, X. Yu, J. C. Meredith, M. L. Shofner, T. A. L. Harris, S. Vuong, B. Einsla, M. Einsla, J. Accardo, M. A. Upshur (2025). Roll-To-Roll Processing of Sustainable Packaging Materials Using Modified Celluloses *(under prep)*.

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Books (In Preparation)

S. Fagbemi, (2025), The Real Human Evolution.

PATENTS

S. Fagbemi, M. Piri. Methods And Devices for Enhancement of Porous Media Images- U.S. Patent Application No. 18/239,476

INVITED TALKS

S. Fagbemi. GPU-Accelerated Multiscale Flow and Transport in Deformable Porous Media. *Oak Ridge National Laboratory*, (2023)

S. Fagbemi, P. Tahmasebi (2023), Multiphase Fluid-Structure Interaction in Deformable Porous Media at multiple scales, *Engineering Mechanics Institute Conference* 2023, Atlanta GA, June 6th -9th, 2023

S. Fagbemi, (2022), Flow-through deformable porous media, University of Wyoming, March 2022

CONFERENCES TALKS

S. Fagbemi, J. Rhone, J. Meredith, M. Shofner, S. Vuong, B. Einsla, M. L. Einsla, J. Accardo, M. A. Upshur, T. A. L. Harris (2024), Roll-to-roll processing of sustainable packaging materials using modified biopolymers. ACS Fall Meeting, Denver, CO, Aug. 18-22

S. Fagbemi, T. A. L. Harris, Multiscale Simulation of Slot Die Coating Using Darcy-Brinkman-Biot Approach, World Congress on Computational Mechanics, Vancouver, Canada, 2024 *(Declined due to immigration issues)*

X. Qiu**, S. Fagbemi**, *J. Rhone, J. C. Meredith, M. L. Shofner, T. A. L. Harris, International Conference on Nanotechnology for Renewable Materials (Nano), TAPPINano Conference, June 10-14, 2024, Atlanta GA

S. Fagbemi, Y. Ji, J. C. Meredith, M. L. Shofner, T. A. L. Harris, Advanced Coating Symposium, TAPPICon, April 28-29, 2024, Cleveland Ohio

S. Fagbemi, T. Harris (2023). Manufacturing of Renewable Barrier Thin Films for Packaging Applications Using Multiscale Modeling Approach. Postdoctoral Research Symposium, Georgia Institute of Technology, October 2023.

S. Fagbemi, P. Tahmasebi, M. Piri (2023). Multiphase Fluid-Structure Interaction in Deformable Porous Media at multiple scales, *17th U.S. National Congress on Computational Mechanics,* Albuquerque, New Mexico, July 23rd-27th 2023

S. Fagbemi, P. Tahmasebi (2023), Multiphase Fluid-Structure Interaction in Deformable Porous Media at multiple scales, *Engineering Mechanics Institute Conference* 2023, Atlanta GA, June 6th -9th, 2023

S. Fagbemi, (2022), Multi-scale hydro-mechanical interactions in fluid-bearing sedimentary rocks. *6th Coastal Bend, Mathematics & Statistics Conference (CBMSC)*, Texas A&M University-Corpus Christi, April 9th, 2022

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T. Ogundare, **S. Fagbemi**, (2022), Lockup Prediction in Deviated Wells", *Onshore Petroleum Technical Conference*, ASME

*Y. Wu, K. Liu, C. Lin, **S. Fagbemi**, (2022), InterPore2022 Conference, Simulation of Two-Phase Flow and Distribution Characteristics of Non-Wetting Phase in Multiscale and Heterogeneous Digital Rocks*, Advances in modeling and simulation of poromechanics* at InterPore2022, Khalifa University, Abu Dhabi, 30th May – 2nd June, 2022

S. Fagbemi, (2019), Fluid-solid interaction in porous media, *1st Annual Meeting, Society of Industrial and Applied Mathematics (SIAM)* Northern States Section, at the University of Wyoming, September 27th- 29th, 2019

ADVISING & TEACHING

Students advised/mentored.

- Wenhao Wang; MS student (Georgia Tech) (2023)
- Hao Fang; MS student (Georgia Tech) (2023)
- Promise Nzete; MS student (Georgia Tech) (2023)
- Oubai Elagab, PhD student (UW); paper in prep (2021-2022)

Teaching

- Introduction to computing, PETE 2020, Department of PETE, (UW) (2019)
- Dynamics, PETE 2050, Department of PETE, (UW) (2017)
- Well testing, PETE 4225, Department of Petroleum Engineering, (UW) (TA) (2017)

GRANTS WRITTEN

- Director's Discretion (DD) Proposal for Frontier Supercomputer Allocation DOE/BES: Modeling and Simulation of Efficient Non-Equilibrium Thermochemical Processes for Industrial Heating Applications Using High-Performance Computing - *Granted* (Nov. 2024)
- National Science Foundation (NSF) Proposal (Mar. 2023)
  Proposal on process-structure-property relationships for micro-particle distribution in thin film enabled by machine learning Georgia Institute of Technology – *Not Funded*
- Energy Frontier Research (EFRC) DE-FOA-0002653 – *Not Funded* (May 2022)

JOURNAL REVIEWS

- Journal of Hydrology (Dec. 2024)
- MDPI Journal – Processes (Nov. 2024)
- MDPI Journal – Applied Sciences (Nov. 2024)
- MDPI Journal – Applied Sciences (Oct. 2024)
- MDPI Journal – Processes (Oct. 2024)
- MDPI Journal – Water (Sept. 2024)
- MDPI Journal – Applied Sciences (Aug. 2024)
- Society of Petrophysicists & Well Log Analysts (Aug. 2024)
- International Journal of Fluid Mechanics Research. (Oct. 2022)
- Society of Petrophysicists & Well Log Analysts (Aug. 2022)
- MDPI Journal – Water (Aug. 2018)

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PROFESSIONAL LEADERSHIP AND SERVICE

- Editor: Special Issue- Sustainable Development in Functional Biomaterials: Coating Methods and Optimization, MDPI Journal – Sustainability (Dec. 2024)
- Main Organizer for ICOSSAR'25 Mini-Symposium: Computational Modeling of Thermal Properties during Manufacturing of Components in Structural and Engineering Systems (Oct. 2024)
- Faculty Hackathon Mentor, Jackson State University in collaboration with ORNL (Sept. 2024)
- Oak Ridge Postdoc Association (ORPA) Evaluation Committee (Sept. 2024)
- ACS Fall Meeting Session Presider, Division of Cellulose and Renewable Materials (Aug. 2024)
- ORPA Research Symposium Session Chair, Oak Ridge National Laboratory (Jul. 2024)
- ORPA Research Symposium Abstract Reviewer, Oak Ridge National Laboratory (Jul. 2024)
- IGNITE SULI/CCI Interns Talk Judge, Oak Ridge National Laboratory (Mar. 2024)
- Co-hosting Emerging Leaders Lecture Series at Georgia Tech. (Oct. 2022 – May 2023)
- Onshore Petroleum Technical Conference (ASME). Committee co-chair (Jan. – Aug. 2022)
- Family Housing Network (formerly Faith Family Hospitality) Facilitator, Fort Collins, CO (Fall 2021)
- Citizens Climate Lobby, Houston, TX (Fall 2015)

AWARDS, CERTIFICATIONS & FELLOWSHIPS

- OLCF Distinguished Postdoctoral Award, Oak Ridge National Laboratory (2024)
- Rising Star in Mechanical Engineering, UC Berkeley (2023)
- LMAP Leadership (2023)
- ARL Network Award (Travel Award) (2023)
- President's Postdoctoral Fellowship (PPFP) (2022)
- Harry Hill Graduate Excellence Award, (UW) for academic excellence during Ph.D. (2019)
- Microsoft Technical Associate (MTA) (2015)
- Petrel Workflow, NeXT, Schlumberger (2014)
- Floyd L. Kallam Award, (USC) $3K (2013)
- Floyd L. Kallam Award, (USC) $4.7K (2012)

TECHNICAL, PROGRAMMING SKILLS AND PACKAGES

Software development
Finite element (FE), and finite volume (FV) methods
Python, C/C++, Java, MATLAB, CUDA programming
Machine learning (ML)
Computational Fluid Dynamics (CFD), Computational Solid Mechanics (CSM)
Computational fluid (dynamics)-discrete element method (CFDEM) modeling
Pore-network modeling
Fluid-Structure Interaction (FSI)
Digital Rock Physics/Technology
High-Performance Computing (HPC)
3D printing, CAD/CAM

PROFESSIONAL ASSOCIATIONS

Engineering Mechanics Institute (EMI)

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American Chemical Society (ACS) - Community Associate
American Society of Mechanical Engineers (ASME)
Society of Petroleum Engineers (SPE)
Society of Industrial and Applied Mathematicians (SIAM)
International Association for Computational Mechanics (IACM)
United States Association for Computational Mechanics (USACM)