# Dr. Adewale Giwa

Assistant Professor, Chemical and Water Desalination Engineering Program (CWDE), Department of Mechanical and Nuclear Engineering (MNE), University of Sharjah, United Arab Emirates. Phone number: +971 6 505 0973. Email address: agiwa@sharjah.ac.ae.

## Education

- Ph.D. in Interdisciplinary Engineering, May 2018: Khalifa University, United Arab Emirates in collaboration with Massachusetts Institute of Technology, United States of America.
- M.Sc. in Water & Environmental Engineering, June 2014: Masdar Institute of Science and Technology, United Arab Emirates in collaboration with Massachusetts Institute of Technology, United States of America.
- B.Sc. in Chemical Engineering, November 2007: Obafemi Awolowo University, Nigeria.

## Professional Experience

**(1) Assistant Professor**, Chemical and Water Desalination Engineering Program, Department of Mechanical and Nuclear Engineering, University of Sharjah, 2023-Date.

Teaching, Research, and Service Responsibilities:

- Teaching courses in membrane and thermal desalination, membrane desalination, water treatment technologies, thermal sciences (involving thermodynamics, fluid mechanics, and heat and mass transfer), and design of thermal systems.
- **Taught:**
  0404241: Thermal Sciences
  0408274: Membrane I: Introduction to Membrane Science and Technology
  0408275: Fundamentals of Thermal Desalination Processes
  0408277: Principles of Heat Transfer
  0408280: Principles of Water Treatment Technologies
  0408370: Thermal System Design and Analysis,
  0408371: Membrane II: Preparation, Characterization, Performance, and Fouling Testing
  0408375: Membrane III: Applied Membrane Separation Processes
- Solving research problems related to water security, desalination, wastewater treatment, membrane science and technology, modeling and optimization, environmental sustainability, environmental biotechnology, circular economy, and waste management.
- Serving as one of the College of Engineering's Representatives, University of Sharjah Open Days, and course advisor to many students.
- Contributing to the Department of Mechanical and Nuclear Engineering's committees on teaching and learning, social affairs, and research committees.
- Serving as the Chair of the Department of Mechanical and Nuclear Engineering's committee on student clubs and societies.
- Contributed to the substantive study plan of the Chemical and Water Desalination Engineering (CWDE) program at the University of Sharjah.
- Contributed to updating the Course Syllabi of the CWDE program for accreditation.
- Contributed to aligning the Course Learning Objectives (CLOs) of the CWDE Program courses to the new University of Sharjah competencies.

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- Currently serving as CWDE program's field trip coordinator and playing a crucial role in planning and organizing educational trips and experiences outside the campus to engage with the companies and organizations in the community, for example, Power Plant Visit organized by the Dubai Electricity and Water Authority (DEWA), Sharjah Sewage Treatment Plant, Abu Dhabi International Petroleum Exhibition, IBM digital skills seminar, International Desalination Association (IDA) & Global Water Intelligence (GWI) workshops and so on.
- Supervised Senior Design Project Students.

**(2) Visiting Scholar**, School of Mechanical Engineering, Purdue University, West Lafayette, Indiana, United States of America, Winter 2023.

Faculty Responsibilities:

- Participated in research collaborations on vapor selective membranes for air dehumidification and related processes.

**(3) Chemical Engineering Book Editor**, Elsevier, 2022-2024.

Editorial Responsibilities:

- Editing book chapters on electrochemical membrane technologies including topics on Joule heaters, electro-forward osmosis, membrane bioelectrochemical technologies, electro-membrane and electrocatalytic membrane bioreactors, electrodialysis and membrane capacitive deionization, energy production and efficiency, fabrication of electrochemical membranes, cost of electrochemical membrane technologies, technoeconomic and life cycle assessments, electrochemical membrane process modeling and simulations, electrochemical membrane pre-treatment technologies, and electrochemical membrane-based air dehumidification.

**(4) Post-Doctoral Fellow**, Department of Chemical Engineering, Khalifa University, 2018-2022.

Teaching and Research Experience:

- Taught **Design Projects (CHEG201)** on Biomass, Bioenergy and Biochemicals, specifically on algal cultivation, production of valuable products including biodiesel & carotenoids from algae, and remediation of crude oil-contaminated saline water using novel dispersants from fish and lobster wastes at Khalifa University, Abu Dhabi, United Arab Emirates in 2018-2021.

- Taught **Design Projects (CHEG498)** on Aspen Simulations for the design and prediction of the cost-competitiveness of biodiesel production from waste cooking oil at Khalifa University, Abu Dhabi, United Arab Emirates in Spring semester 2021. Provided technical support for Khalifa University's Engineering students, which enabled them to be able to submit project proposals to competitions in the UAE in 2018-2022.

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- Carried out research on microalgae valorization for production of carotenoids, lipids, and other value-added products.

**(5) Research & Teaching Assistant**, Department of Chemical Engineering, Khalifa University, 2014-2018.

**(6) Research & Teaching Assistant**, Department of Water & Environmental Engineering, Masdar Institute of Science and Technology, 2012-2014.

Teaching and Research Experience:

- Taught **Desalination (WEN504)** at Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates in Fall semesters 2013, 2014, 2015, 2016, and 2017.
- Taught **Sustainable Energy (UCC501)** projects on the estimation of sustainability criteria for engineering projects at Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates in Fall semester 2015 and Spring semesters 2014 and 2015.
- Taught **Desalination (WEN504)** projects on sustainable desalination technologies (including design and simulation of solar-powered reverse osmosis desalination plants, forward osmosis, microbial desalination cells, waste heat-powered membrane distillation, humidification dehumidification technologies and other forms of renewable energy-powered desalination, biomimetic membranes, 3D printing of membranes, and pressure retarded osmosis) at Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates in Spring semesters 2014, 2015, 2016 and 2017.
- Taught **Chemistry and Separation Science** at Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates in 2015.
- Taught **Research Internship Design Projects** on the fabrication and characterization of nanoporous mixed matrix membranes for low-energy wastewater and brine treatment, MATLAB simulations of osmotic membrane bioreactor for simultaneous wastewater and brine treatment towards circular economy, and membrane distillation that employs waste heat for draw regeneration at Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates in 2017 and 2018.
- Carried out research on the experimental investigation and modeling of the electrochemical membrane bioreactor for wastewater treatment and sludge reuse.

**(7) Mathematics Teacher**, Department of Science, Deeper Life Schools, Lagos, Nigeria, 2011-2012.

Teaching Experience:

- Taught high school mathematics using e-learning techniques.
- Developed e-learning curriculum for high school mathematics.

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**(8) Process Engineer**, T.Y. Petrochemicals Refinery, Kaduna, Nigeria, 2009-2011.

Leadership Experience:

Supervised and provided instructions to process assistants on the following tasks.

- Sustainable design, modification and troubleshooting of equipment used in manufacturing refined products (mineral drilling oil and petroleum jelly).
- Sustainable design of new units and retrofitting of old equipment.
- Identification, development, and implementation of sustainable processes to improve profitability, project quality, safety and reduce product variability.
- Alignment of processes to safety codes and environmental standards.

## Research Interests

- Water Security
- Desalination
- Wastewater Treatment
- Membrane Science and Technology
- Environmental Sustainability
- Circular Economy and Waste Management

## Research Statistics

- h-index: 32
- i10-index: 49
- Google Scholar Citations: 5,077

*Scopus Profile Link:*
https://www.scopus.com/authid/detail.uri?authorId=56949131700
*Google Scholar Profile Link:*
https://scholar.google.ae/citations?user=ur3rL-sAAAAJ&hl=en
*ResearchGate Profile Link:*
https://www.researchgate.net/profile/Adewale-Giwa
*LinkedIn Profile Link:*
https://ae.linkedin.com/in/adewale-giwa
*ORCID Profile Link:*
https://orcid.org/0000-0002-3509-7477
*Web of Science Profile Link:*
https://www.webofscience.com/wos/author/record/AAC-1559-2019

## Research Experience

**(1) Desalination and Wastewater Treatment**

(a) Edited the electrochemical membrane technology book focusing on electrochemical membrane pretreatment and posttreatment techniques, electro-forward osmosis and electrically conductive reverse osmosis membranes, membrane-based

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bioelectrochemical processes, electrochemical membrane bioreactors, electrodialysis and membrane capacitive deionization, electrothermal membrane process, fabrication and characterization of electrochemical membranes, production of chemicals and energy from electrochemical membrane technology, economic analysis and life cycle assessment of electrochemical membrane technology.

*Reference:*

***A Giwa**. Electrochemical Membrane Technology. (2024). Elsevier.*
*https://shop.elsevier.com/books/electrochemical-membrane-technology/giwa/978-0-443-14005-1*

(b) Measured contaminants including chemical oxygen demand, ammonium-nitrogen, nitrites, nitrates, phosphates, total nitrogen, total phosphorus, heavy metal ions, and bacteria in polluted waters using analytical techniques and standards (APHA standards).

(c) Measured the concentrations of cations and anions in saline water and wastewater; measured other properties including pH, turbidity, alkalinity, silt density index, dewaterability, filterability, total dissolved solutes, total suspended solids, volatile suspended solids, and so on.

(d) Compared concentrations in treated wastewater and desalinated water with regulatory standards (RSB and WHO quality criteria for different applications).

(e) Predicted the technical performance of activated sludge wastewater treatment and reverse osmosis desalination using Used DESASS and ROSA, respectively.

(f) Designed and operated an electro-membrane bioreactor for wastewater treatment and found that the bioreactor removed 100% of phosphorus and 80% of heavy metal ions from municipal wastewater, compared to 40% of phosphorus and 50% of heavy metal ions removal in a commercial membrane bioreactor plant. Used MATLAB to carry out the numerical and artificial neural networks (ANN) modeling of the electro-membrane bioreactor and observed that both modeling methods have errors below 5% but ANN modeling allows more data flexibility and accuracy.

*Reference:*

***A Giwa**, S Daer, I Ahmed, PR Marpu, SW Hasan. Experimental investigation and artificial neural networks ANNs modeling of electrically enhanced membrane bioreactor for wastewater treatment. Journal of Water Process Engineering (2016) 11, 88-97.*

***A Giwa**, SW Hasan. Theoretical investigation of the influence of operating conditions on the treatment performance of an electrically induced membrane bioreactor. Journal of Water Process Engineering (2015) 6, 72-82.*

***A Giwa**, SW Hasan. Numerical modeling of an electrically enhanced membrane bioreactor (MBER) treating medium- strength wastewater. Journal of environmental management (2015) 164, 1-9.*

(g) Synthesized ceramic and mixed matrix membranes from titanium dioxide, manganese dioxide, graphene oxide and cyclodextrin to remove heavy metal ions and 100% of bacteria from municipal wastewater.

*References:*

***A Giwa**, SM Jung, M Ahmed, W Fang, J Kong, SW Hasan. Selectivity of nanoporous $MnO_2$ and $TiO_2$ membranes for residual contaminants in treated wastewater. Chemical Engineering & Technology (2018) 41, 413-420.*

***A Giwa**, SW Hasan. Novel polyethersulfone-functionalized graphene oxide (PES-fGO) mixed matrix membranes for wastewater treatment. Separation and Purification Technology (2020) 241, 116735.*

***A Giwa**, SM Jung, J Kong, SW Hasan. Combined process of electrically-membrane bioreactor and $TiO_2$ aerogel filtration for efficient wastewater treatment. Journal of Water Process Engineering (2019) 28, 107-114.*

***A Giwa**, Shadi W Hasan. Nucleophilic-functionalized β-cyclodextrin-polyethersulfone structures from facile lamination process as nanoporous membrane active layers for wastewater post-treatment: Molecular implications. Journal of Membrane Science (2018) 563, 914-925.*

(h) Synthesized hollow fiber and flat sheet polymeric membranes from polyethersulfone, polyvinylidene fluoride, polyvinyl pyrrolidone, ethanol and glycerol additives for wastewater treatment to remove organic contaminants, heavy metal ions, and bacteria from wastewater.

*Reference: **A Giwa**, S Chakraborty, MO Mavukkandy, HA Arafat, SW Hasan. Nanoporous hollow fiber polyethersulfone membranes for the removal of residual contaminants from treated wastewater effluent: Functional and molecular implications. Separation and Purification Technology (2017) 189, 20-31.*

(i) Synthesized membranes from polyvinylidene fluoride/polyvinylpyrrolidone and investigated the implication of polyvinylpyrrolidone leaching during membrane filtration.

*Reference: M Mavukkandy, **A Giwa**, MR Bilad, A Giwa, SW Hasan. Leaching of PVP from PVDF/PVP blend membranes: impacts on membrane structure and fouling in membrane bioreactors. Journal of Materials Science (2016) 51, 4328-4341.*

(j) Reviewed the 3D-printing technologies for fabricating membranes and spacers for desalination and found that Fused Deposition Modeling and Stereolithography techniques are unsuitable for printing of membrane spacers due to their high deviation from the specifications and low mechanical strength, whereas Polyjet and Selective Laser Sintering techniques are more suitable.

*Reference: HA Balogun, R Sulaiman, SS Marzouk, **A Giwa**, SW Hasan. 3D printing and surface imprinting technologies for water treatment: A review. Journal of Water Process Engineering (2019) 31, 100786.*

(k) Reviewed the aquaporin biomimetic membranes applied for desalination and found that these membranes could provide commercially acceptable levels of water permeability and high salt rejection, provided they have porous supports that could withstand mechanical and chemical stresses.

*Reference: **A Giwa**, SW Hasan, A Yousuf, S Chakraborty, DJ Johnson, N Hilal. Biomimetic membranes: A critical review of recent progress. Desalination (2017) 420, 403-424.*

(l) Carried out reviews on the recent polymeric and nano-enhanced membranes for reverse osmosis and found that graphene, zeolites, carbon nanotubes, silica, silver, and titanium dioxide are the predominantly tested nanoparticles in recent investigations.

*References:*
***A Giwa**, N Akther, V Dufour, SW Hasan. A critical review on recent polymeric and nano-enhanced membranes for reverse osmosis. RSC Advances (2016) 6, 8134-8163.*
*S Daer, J Kharraz, **A Giwa**, SW Hasan. Recent applications of nanomaterials in water desalination: a critical review and future opportunities. Desalination 367, 37-48.*

(m) Carried out a review on the polymeric materials for membrane filtration in water purification and found that cellulose acetate, polyamide, polyvinylidene fluoride, polysulfone, polyethersulfone, polyvinyl chloride, polyimide, polyacrylonitrile, polyethylene glycol, polyvinyl alcohol, poly(methacrylic acid), poly(arylene ether

ketone), poly(ether imide), polyaniline nanoparticles, and polyethersulfone amide have been used in recent times for reverse osmosis, nanofiltration, ultrafiltration, and microfiltration processes.

*Reference: **A Giwa**, M Ahmed, SW Hasan. Polymers for Membrane Filtration in Water Purification. Polymeric Materials for Clean Water, Springer book chapter (2019), 167-190.*

(n) Reviewed the challenges and opportunities of graphene-based materials for water purification and found that graphene exhibits the potential to be used in graphene-based membranes, adsorbents, catalysts, photocatalysts, electrocatalysts, photoelectro-catalysts, and as a disinfection agent in water purification applications.

*Reference: M Ahmed, **A Giwa**, SW Hasan. Challenges and opportunities of graphene-based materials in current desalination and water purification technologies. Nanoscale Materials in Water Purification, CRC book chapter (2019), 735-758.*

(o) Reviewed the emerging trends in membrane science and technology for sustainable water treatment worldwide and found that the reuse of membranes at their end-of-life stage, reuse of waste brine or sludge, energy harvesting from wastes, waste reduction by membrane antifouling approaches, plasma-based water treatment, ultralow pressure membrane filtration, the use of more sustainable materials such as quantum dots (QDs) and green solvents for membrane fabrication, 3D and 4D printing of membrane module parts, and AI tools are some emerging trends.

*Reference:*
*A Yusuf, HK Amusa, JO Eniola, **A Giwa**, O Pikuda, A Dindi, MR Bilad. Hazardous and emerging contaminants removal from water by plasma-based treatment: a review of recent advances. Chemical Engineering Journal Advances (2023), 100443.*
*C. L. Leong, MR Bilad, N Shamsuddin, H Suhaimi, N Arahman, **A Giwa**, A Yusuf. Ultralow pressure membrane filtration for water and wastewater treatment. In Current Developments in Biotechnology and Bioengineering (pp. 113-141). (2023). Elsevier.*
*A Yusuf, A Sodiq, **A Giwa**, J Eke, O Pikuda, G De Luca, JL Di Salvo, S Chakraborty. A review of emerging trends in membrane science and technology for sustainable water treatment. Journal of Cleaner Production (2020), 121867.*

## (2) Water Security and Renewable Energy

### *Freshwater Sustainability*

(a) Developing a model and application to monitor and forecast water access conditions in the United Arab Emirates and Middle East and North Africa (MENA) in general, in collaboration with the multinational technology company, IBM.

(b) Developed a model to analyze and forecast the desert encroachment and temporal trends of precipitation in Nigeria's climate zones.

*Reference: **A Giwa**, A Yusuf. Desert encroachment and the temporal trends of precipitation in Nigeria's climate zones. Journal of Phase Change Materials (2022) 2, 41-51.*

(c) Assessed the level of freshwater sustainability in United Arab Emirates and observed that up to 19.8% domestic water savings could be achieved by using water-efficient household fixtures; agricultural irrigation could be achieved through complete wastewater reuse; water leakages in distribution pipes could be reduced or almost

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eliminated through noise loggers, automated pumps, and pressure relief valves; 20% increase in freshwater storage could be achieved by cloud seeding.

*Reference: **A Giwa**, A Dindi. An investigation of the feasibility of proposed solutions for water sustainability and security in water-stressed environment. Journal of Cleaner Production (2017) 165, 721-733.*

***Solar Power, Wind and Geothermal Energy***

(d) Reviewed the renewable energy sources employed for desalination and found that solar, wind, and geothermal energy are the major sources for desalination.

*Reference: A Abusharkh, **A Giwa**, S Hasan. Wind and geothermal energy in desalination: a short review on progress and sustainable commercial processes. Industrial Engineering and Management (2015) 4 (175).*

***Solar Thermal Energy***

(e) Carried out a review on the recent advances in humidification dehumidification technology for water treatment and found that the potential economic and environmental benefits of the technology include feasibility of being powered by sustainable energy sources such as solar thermal energy, ability to operate at low temperature, low maintenance requirements, and simple construction needs.

*Reference: **A Giwa**, N Akther, A Al Housani, S Haris, SW Hasan. Recent advances in humidification dehumidification (HDH) desalination processes: Improved designs and productivity. Renewable and Sustainable Energy Reviews (2016) 57, 929-944.*

***Osmotic Energy***

(f) Carried out reviews on the generation and application of osmotic power from brine and other draw solutions for desalination and wastewater treatment.

*References:*

*N Akther, A Sodiq, **A Giwa**, S Daer, HA Arafat, SW Hasan. Recent advancements in forward osmosis desalination: a review. Chemical Engineering Journal (2015) 281, 502-522.*

***A Giwa**, SW Hasan. Integrating Pressure Retarded Osmosis and Membrane Distillation. Current Trends and Future Developments on (Bio-) Membranes. Elsevier book chapter (2019), 351-363.*

*BBA Al Mahri, HA Balogun, A Yusuf, **A Giwa**. Electro-osmotic thermal process model for performance enhancement of forward osmosis integrated with membrane distillation. Separation and Purification Technology (2020), 116494.*

***Fuel Cells***

(g) Reviewed microbial desalination cell (MDC) technology for energy production and water treatment and found that MDCs could achieve up to 99% salt removal, reduce high levels of chemical oxygen demand in wastewater, and provide enough energy to drive downstream processes. Other applications of MDCs include water softening, removal of phenolic compounds from wastewater, and removal of nitrates from groundwater.

*Reference: **A Giwa**, V Naddeo, SW Hasan. Recent advancements in the application of microbial desalination cells for water desalination, wastewater treatment, and energy production. Water Management: Social and Technological Perspective, CRC Press book chapter (2017).*

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## (3) Environmental Biotechnology and Sustainability

### *Biomass, Biochemicals and Bioenergy*

(a) Enhanced waste biomass pyrolysis through predictive insights from process simulation integrated with interpretable machine learning models.

*Reference: DC Divine, S Hubert, EI Epelle, A Ojo, A Adeleke, CC Ogbaga, O Akande, PU Okoye, **A Giwa**, JA Okolie. Enhancing biomass Pyrolysis: Predictive insights from process simulation integrated with interpretable Machine learning models. Fuel 366 (2024): 131346.*

(b) Used Gabi 6 to carry out the life cycle assessment of biodiesel and β-carotene coproduction from *Dunaliella salina*.

*Reference: F Khanum, **A Giwa**, M Nour, S Al-Zuhair, H Taher. Improving the economic feasibility of biodiesel production from microalgal biomass via high-value products coproduction. International Journal of Energy Research (2020), 44 (14), 11453-11472.*

(c) Used SuperPro Designer 8.5 and ISO 14040-43 standard methodology to carry out the techno-economic and life cycle assessments of biochar production from date palm waste through concentrated solar power-enabled pyrolysis.

*Reference: **A Giwa**, A Yusuf, O Ajumobi, P Dzidzienyo. Pyrolysis of date palm waste to biochar using concentrated solar thermal energy: Economic and sustainability implications. Waste Management (2019) 93, 14-22.*

(d) Used SuperPro Designer 8.5 to carry out the techno-economic assessment of the production of biodiesel, glycerol, animal feed, organic fertilizer, biogas, bioethanol, biogas, and hydrogen from the integrated biorefinery of Jatropha and microalgae.

*Reference: **A Giwa**, I Adeyemi, A Dindi, C Lopez, C Lopresto, S Curcio, S Chakraborty. Techno-economic assessment of the sustainability of an integrated biorefinery from microalgae and Jatropha: A review and case study. Renewable and Sustainable Energy Reviews (2018) 88, 239-257.*

(e) Assessed the environmental impacts resulting from the cradle-to-grave life cycles of biogas production from *Enteromorpha prolifera* macroalgae and cattle manure, using SimaPro 7.3.

*Reference: **A Giwa.** Comparative cradle-to-grave life cycle assessment of biogas production from marine algae and cattle manure biorefineries. Bioresource Technology (2017) 244, 1470-1479.*

(f) Used Aspen Plus to design and predict the cost of biodiesel production from waste cooking oil.

*(g)* Used HYSYS and UniSim to carry out the techno-economic assessment of biodiesel production from *Nannochloropsis gaditana* through supercritical lipid extraction and transesterification routes. Simapro 8 was used to assess the life cycle impacts of the production process.

*Reference: H Taher, **A Giwa**, H Abusabiekeh, S Al-Zuhair. Biodiesel production from Nannochloropsis gaditana using supercritical CO2 for lipid extraction and immobilized lipase transesterification: Economic and environmental impact assessments. Fuel Processing Technology (2020) 198, 106249.*

(h) Used SimaPro 8.4 to carry out the cradle-to-gate life cycle assessment of bioplastic production from whey proteins obtained from dairy residues.

*Reference: B Chalermthai, **A Giwa**, JE Schmidt, H Taher. Life cycle assessment of bioplastic production from whey protein obtained from dairy residues. Bioresource Technology Reports (2021) 15, 100695.*

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## ***$CO_2$ Capture and Utilization***

(i) Carried out a techno-economic assessment of $CO_2$ utilization from the flue gas emitted by a natural gas combined cycle (NGCC) power plant to produce soda ash. The cost of scrubbing the $CO_2$ by monoethanolamine was also estimated and sensitivity analysis was carried out to investigate the effect of soda ash and input chemical prices on the process economics.

*Reference: A Yusuf, **A Giwa**, EO Mohammed, O Mohammed, A Al Hajaj, MRM Abu-Zahra. $CO_2$ utilization from power plant: A comparative techno-economic assessment of soda ash production and scrubbing by monoethanolamine. Journal of Cleaner Production (2019) 237, 117760.*

## ***Desalination and Wastewater Treatment***

(j) Used MATLAB to simulate the techno-economic performance of a molten salt-thermosiphon in a reverse osmosis desalination unit powered by concentrated solar power.

*Reference: **A Giwa**, SW Hasan. Novel thermosiphon-powered reverse osmosis: Techno-economic model for renewable energy and freshwater recovery. Desalination (2018) 435, 152-160.*

(k) Used MATLAB to carry out the techno-economic and environmental impact assessments of a hybrid Multi-Stage Flash/Reverse Osmosis system for Al Taweelah A2 commercial desalination plant.

*Reference: A AlBloushi, **A Giwa**, T Mezher, SW Hasan. Environmental impact and techno-economic analysis of hybrid MSF/RO desalination: The case study Al Taweelah A2 plant. Sustainable Desalination Handbook – Process Design and Implementation Strategies. Elsevier book chapter (2017).*

(l) Used MATLAB and SimaPro 7.3.3 to perform the techno-economic and life cycle assessments of seawater desalination using ambient air and waste heat recovered from photovoltaic panels (by humidification dehumidification technology).

*Reference: **A Giwa**, H Fath, SW Hasan. Humidification–dehumidification desalination process driven by photovoltaic thermal energy recovery (PV-HDH) for small-scale sustainable water and power production. Desalination (2016) 377, 163-171.*

(m) Used Python 2.7 to carry out the techno-economic assessment of desalination technologies employed in 181 countries across the world.

*Reference: J Eke, A Yusuf, **A Giwa**, A Sodiq. The global status of desalination: an assessment of current desalination technologies, plants and capacity. Desalination (2020), 495, 114633.*

(n) Carried out the economic assessment of electro-membrane bioreactor for wastewater treatment and estimated the cost to be \$0.86 per $m^3$ of water produced – an amount less than the cost of producing water using a commercial membrane bioreactor.

*Reference: **A Giwa**, SW Hasan. Introducing membrane specie permeability coefficient and economic assessment of polycomposite membrane bioreactor integrated with electric field. Journal of Water Process Engineering (2017) 19, 338-345.*

## ***Sustainable Cleanup of Oil Spill***

(o) Developed an oil spill cleaning agent from activated carbon prepared from date palm leaves and polydopamine and found that the cleaning agent is more environmentally friendly than conventional fossil fuel-based agents.

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*Reference: **A Giwa**, H Taher. Dispersion-Sorption Balance (DSB) of Pickering emulsions of polydopamine-polyethylenimine- modified activated carbon for oil spill treatment. Journal of Environmental Chemical Engineering (2020), 103950.*

(p) Synthesized biodegradable oil spill dispersants from proteins isolated from fish and lobster wastes, using lecithin from soybeans as a solvent and found that the dispersant exhibited an impressive emulsifying activity of 94.5% and foaming level of just 1%.

*Reference:*
***A Giwa**, B Chalermthai, B Shaikh, H Taher. Green dispersants for oil spill response: A comprehensive review of recent advances. Marine Pollution Bulletin (2023), 193, 115118.*
*M Saleh, M Alhameli, B Chalermthai, **A Giwa**, H Taher. Remediation of crude oil-contaminated saline water using novel dispersants from fish and lobster wastes. Results in Engineering (2021), 100236.*

(q) Tested the performance of a hydrothermally treated peat biochar for crude oil sorption in seawater and obtained a sorption efficiency of 32.5 g of crude oil per g of the peat biochar - higher than values reported in other related studies, that is, 19.6 g/g for sphagnum peat, 11.8 g/g for nature sorb peat, and 20.5 g/g for commercial activated carbon.

*Reference: K AlAmeri, **A Giwa**, L Yousef, A Alraeesi, H Taher. Sorption and removal of crude oil spills from seawater using peat-derived biochar: An optimization study. Journal of environmental management (2019) 250, 109465.*

(r) Investigated the potential of cholesterol, a bio-based material, for oil spill cleanup and discovered that the optimum effectiveness of cholesterol for crude oil cleanup by herding/gelling was 79.5%.

*Reference: M. Abuoudah, **A. Giwa**, I. Nashef, F. AlMarzooqi, H. Taher. Bio-based herding and gelling agents from cholesterol powders and suspensions in organic liquids for effective oil spill clean-up. Chemical Engineering Journal Advances (2022), 100357.*

## (4) Circular Economy and Waste Management

### *Waste Heat*

(a) Recovered waste heat from solar photovoltaic panels and employed the recovered heat for seawater desalination.

*Reference: **A Giwa**, H Fath, SW Hasan. Humidification–dehumidification desalination process driven by photovoltaic thermal energy recovery (PV-HDH) for small-scale sustainable water and power production. Desalination (2016) 377, 163-171.*

### *Waste Sludge*

(b) Produced bio-fertilizer from municipal wastewater sludge by removing deposited metals from the sludge. Estimated that the recovery of bio-fertilizer from wastewater sludge in Abu Dhabi could result in an annual revenue of US$2.83 million per year, if sold at US$54.4 per ton.

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*Reference: SW Hasan, I Ahmed, AA Housani, **A Giwa**. Molecular and ionic-scale chemical mechanisms behind the role of nitrocyl group in the electrochemical removal of heavy metals from sludge. Scientific reports (2016) 6, 31828.*

***Dairy Wastes***

(c) Produced bioplastics from whey proteins obtained from dairy wastes.

*Reference: B Chalermthai, **A Giwa**, JE Schmidt, H Taher. Life cycle assessment of bioplastic production from whey protein obtained from dairy residues. Bioresource Technology Reports (2021) 15, 100695.*

***Flue Gas***

(d) Utilized flue gas for soda ash production.

*Reference: A Yusuf, **A Giwa**, EO Mohammed, O Mohammed, A Al Hajaj, MRM Abu-Zahra. $CO_2$ utilization from power plant: A comparative techno-economic assessment of soda ash production and scrubbing by monoethanolamine. Journal of Cleaner Production (2019) 237, 117760.*

***Reject Brine***

(e) Recovered freshwater from reject brine. Treated reject brine from a desalination plant using graphene platelet-nanocoated polyethylene membranes in a membrane distillation unit. Found that the nanocoated membranes reduced membrane fouling rate & recover up to 78% pure water from brine, compared to convention brine discharge into the environment.

*Reference: A Yusuf, **A Giwa**, EO Mohammed, O Mohammed, A Al Hajaj, MRM Abu-Zahra. $CO_2$ utilization from power plant: A comparative techno-economic assessment of soda ash production and scrubbing by monoethanolamine. Journal of Cleaner Production (2019) 237, 117760.*

***Food Waste***

(f) Used food waste obtained from Abu Dhabi National Exhibition Center (ADNEC) to produce cultivation media for *Chlorella vulgaris*. Developed a biomass growth medium for *Chlorella vulgaris* cultivation from reject desalination brine and food waste. Found that the microalgae assimilated 89% more nitrogen and 137% more phosphorus from the medium, compared to the conventional Johnson's medium.

*Reference: **A Giwa**, B Chalermthai, N Moheimani, H Taher. Effective nutrient removal and metabolite accumulation by C. vulgaris cultivated using digested food waste and brine. Environmental Technology & Innovation (2021) 24, 101935.*

***Hydrocarbon Pollutants***

(g) Used RBCA to simulate the fate and transport of hydrocarbon pollutants in water.

***Microplastics***

(h) Reviewed the technologies for removing microplastics from water, including membrane technologies.

*Reference: A Yusuf, A Sodiq, **A Giwa**, J Eke, O Pikuda, JO Eniola, B Ajiwokewu, NS Sambudi, MR Bilad. Updated review on microplastics in water, their occurrence, detection, measurement, environmental pollution, and the need for regulatory standards. Environmental Pollution, (2021), 118421.*

Assistant Professor, Chemical and Water Desalination Engineering Program (CWDE), Department of Mechanical and Nuclear Engineering (MNE), University of Sharjah, United Arab Emirates. Phone number: +971 6 505 0973. Email address: agiwa@sharjah.ac.ae.

***Emerging Hazardous Contaminants***

(i) Reviewed the technologies for removing contaminants of emerging concern including pharmaceuticals, disinfection byproducts, herbicides, synthetic agricultural chemicals, surfactants, perfluorinated substances, oil & grease, anthropogenic nanomaterials, other persistent organic pollutants, and other micropollutants from wastewater.

*References:*

***A Giwa**, A Yusuf, HA Balogun, NS Sambudi, MR Bilad, I Adeyemi, S Chakraborty, S Curcio. Recent advances in advanced oxidation processes for removal of contaminants from water: a comprehensive review. Process Safety and Environmental Protection (2020), 146, 220-256.*

*M Ahmed, MO Mavukkandy, **A Giwa**, M Elektorowicz, E Katsou, O Khelifi, V Naddeo, SW Hasan. Recent developments in hazardous pollutants removal from wastewater and water reuse within a circular economy. npj Clean Water (2022), 5(1), 1-25.*

*S Jamaly, **A Giwa**, SW Hasan. Recent improvements in oily wastewater treatment: Progress, challenges, and future opportunities. Journal of environmental sciences 37, 15-30.*

*Reference: **A Giwa**, A Dindi, J Kujawa. Membrane bioreactors and electrochemical processes for treatment of wastewaters containing heavy metal ions, organics, micropollutants and dyes: Recent developments. Journal of hazardous materials (2019) 370, 172-195.*

## (5) Experimental and Theoretical Modeling

(a) Used a gPROMS model, orthogonal array experimental design, correlation analysis and response surface methodology to identify the parameters influencing the operational efficiency of direct contact membrane distillation for water treatment.

*Reference: BB Ashoor, **A Giwa**, SW Hasan, TBMJ Ouarda, A Mhamdi. Multivariable statistical analysis for enhancing performance indicators in direct contact membrane distillation. Desalination and Water Treatment 113, 45-56.*

(b) Performed the statistical correlation and energy consumption analysis of electrically enhanced membrane bioreactor for wastewater treatment.

*Reference: **A Giwa**, SW Hasan. Statistical correlation analysis and energy consumption of electrically enhanced membrane bioreactor for wastewater treatment. Desalination and Water Treatment 68, 60-69.*

(c) Estimated the statistical relationship between dissolved and suspended components in an electrically enhanced membrane bioreactor for municipal wastewater treatment.

*Reference: A Giwa, SW Hasan. Statistical relationship between dissolved and suspended components in an electrically enhanced membrane bioreactor for municipal wastewater treatment. International Conference on Environmental Science and Sustainable Development (ICESSD), Bangkok, Thailand, 2015.*

(d) Performed the statistical analysis of total dissolved solids and turbidity of streams from membrane bio-electro-reactor for municipal wastewater treatment.

*Reference: A Giwa, SW Hasan. Statistical analysis of total dissolved solids and turbidity of streams from membrane bio-electro-reactor for municipal wastewater treatment. International Congress on Water, Waste, and Energy Management, Oporto, Portugal, 2014.*

# Dr. Adewale Giwa

Assistant Professor, Chemical and Water Desalination Engineering Program (CWDE), Department of Mechanical and Nuclear Engineering (MNE), University of Sharjah, United Arab Emirates. Phone number: +971 6 505 0973. Email address: agiwa@sharjah.ac.ae.

**Selected Research Project Funding**

- *Model and App Development for Monitoring and Forecasting Water Access Conditions in the UAE and MENA*

Selection metric: Selected from a pool of submissions globally.
Funding organization: Global technology company, IBM
Total funding awarded: 6.6 million AED
My role: Principal Investigator
*References:*

- *https://mea.newsroom.ibm.com/Sustainability-Accelerator-UoS*
- *https://techxmedia.com/ibm-deepens-climate-commitment-with-free-green-tech-training/*
- *https://uaenews247.com/2023/11/27/ibm-furthers-commitment-to-climate-action-through-the-university-of-sharjah-and-free-training-in-green-and-technology-skills/*
- *https://www.zawya.com/en/press-release/companies-news/ibm-furthers-commitment-to-climate-action-through-the-university-of-sharjah-and-free-training-in-green-and-technology-skills-ijwyld2q*
- *https://www.spglobal.com/esg/podcasts/at-cop28-solving-for-water-challenges-through-public-private-collaboration*
- *https://podcasts.apple.com/pt/podcast/esg-insider-a-podcast-from-s-p-global/id1475521006*

- *3D-Printed Bioplastics from Fish Protein and Green Solvents*

Selection metric: Selected from a pool of submissions globally.
Funding organization: United Nations Education Scientific and Cultural Organization (UNESCO)
Total funding awarded: 110,000 AED
My role: Principal Investigator

- *Improving access to personalized learning and inclusivity through video lessons with Arabic translation and subtitle*

Selection metric: Selected from a pool of submissions nationally.
Funding organization: UAE Ministry of Education
Total funding awarded: 47,000 AED
My role: Principal Investigator

- *Valorization of Food Waste and Desalination Brine for Carotenoid Production*

Selection metric: 25 proposals selected out of 88 submitted proposals.
Funding organization: CIRA Projects
Total funding awarded: 2.76 million AED
My role: Post-Doctoral Fellow

- *Photothermal Heavy Metals Removal from Water*

Selection metric: Best in each theme
Funding organization: Abu Dhabi Department of Education and Knowledge (Research Excellence Award)

# Dr. Adewale Giwa

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Total funding awarded: 999,361 AED

My role: Contributions to proposal.

- *Got Collaboration and in-kind funding (Pebax polymer) from global manufacturing company, Arkema, to support Student Design Projects (SDPs).*

**Thesis and Project Supervision**

- *Maryam Alzarooni, Fatma Alsuwaidi, Reem Al-Yazidi*

Project title: Preparation of Polysulfone-Oxidized Carbon Nanotubes membranes.

- *Farah Abuhantash*

Project title: Valorization of Food Waste and Desalination Brine for Carotenoid Production.

- *Miral K.M. Abuoudah*

Paper title: Bio-based herding and gelling agents from cholesterol powders and suspensions in organic liquids for effective oil spill clean-up.

- *Khawla AlAmeri*

Paper title: Sorption and removal of crude oil spills from seawater using peat-derived biochar: An optimization study.

- *Miral K.M. Abuoudah*

Project title: Nanoporous polyethersulfone-cyclodextrin mixed matrix membrane for water treatment and post-treatment: membrane performance and fouling.

- *Zeinab Saeed*

Project title: Nanoporous polyethersulfone-cyclodextrin membranes for forward osmosis desalination and post-treatment of wastewater: The phenomenon of reverse salt diffusion, membrane fouling, and brine regeneration.

- *Salma Abubaker*

Project title: Characterization of hollow fiber polyethersulfone membrane: membrane performance and fouling.

- *Dina Ashraf Abdelgalil Ali*

Project title: Graphene oxide-polyethersulfone mixed matrix membrane for water treatment and post-treatment: membrane performance and fouling.

- *Aya Zaki Shanti*

Project title: Nucleophilic substitution of nanomaterials in nanomembranes with different enolates – Experimentation.

- *Sarvesh Selvam*

Project title: Numerical modeling of osmotic membrane bioreactor for simultaneous wastewater treatment and brine management with membrane distillation draw regeneration.

- *Mona Bahman, Fatmah Sultan, Moza Saif Ali Saif AlHumaidi, Arwa Alshareif*

Project title: Graphene oxide, $SnO_2$, and $WO_3$ adsorbents for the removal of ions and colloids from water.

- *Hena Abdul Rahiman*

Project title: Numerical modeling of osmotic membrane bioreactor for simultaneous wastewater treatment and brine management with nanofiltration draw regeneration.

- *Mezna Saleh, Mouza Alhameli*

Project title: Remediation of crude oil-contaminated saline water using novel dispersants from fish and lobster wastes (Published in Results in Engineering journal).

# Dr. Adewale Giwa

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- *Technical Support:*
- *Shaimaa Awadh Omar Awadh Barasheed; Zoha Fatima; Baheya Mohamed Hathbour Kaddas Alremeithi; Ahoud Adel Maktoom Ghareeb Al Dhaheri; Khoula Fareed Mohamed Alabed Aljaberi*

Project on *Nannochloropsis sp.* microalgae production from hydrolyzed food waste and brine:

- *Saeed Jamal Saeed Bazara; Saeed Mohamed Salim Mousa Alkaabi; Faisal Dawood Adnan Dawood Almardoud; Mohamad Riyad Abou Hichme; Mubarak Mohammed Redda Zaitoun Almheiri*

ThinkScience SD project on *Chlorella vulgaris* microalgae production from hydrolyzed food waste and brine.

- *Mouza Saif Fadhel Saeed Alhameli, Mezna Muneer Eissa Ismail Saleh*

Project report on oil dispersion in saline water using hydrolysates of proteins extracted from food wastes - submitted to the Abu Dhabi Undergraduate Research Competition.

- Aspen Simulation on the design and prediction of biodiesel production from waste cooking oil.

**Top Achievements and Recognitions in Field**

- 2023: Included in Stanford University's list of Top 1% Scientists in the World
- 2022: Included in Stanford University's list of Top 1% Scientists in the World
- 2021: Included in Stanford University's list of Top 1% Scientists in the World
- 2019: Included in Stanford University's list of Top 2% Scientists in the World
- Co-authored over 80 peer-reviewed publications in journals, books, and conference proceedings.
- Cited in over 5,000 publications, according to Google Scholar.
- Completed over 190 reviews for Elsevier, ACS, RSC, Wiley, Springer, and Taylor & Francis journals and received certificates of outstanding contribution in reviewing by several journals.
    - Awarded the Certificate of Reviewing, Journal of Membrane Science, Elsevier.
    - Awarded the Certificate of Reviewing, Progress in Energy and Combustion Science, Elsevier.
    - Awarded the Certificate of Outstanding Contribution in Reviewing, Desalination Journal, Elsevier.
    - Awarded the Certificate of Outstanding Contribution in Reviewing, Renewable Energy Focus, Elsevier.
    - Awarded the Certificate of Outstanding Contribution in Reviewing, Heliyon Journal, Elsevier.
    - Awarded the Certificate of Outstanding Contribution in Reviewing, Energy Conversion and Management Journal, Elsevier.
    - Awarded the Certificate of Outstanding Contribution in Reviewing, Fuel Journal, Elsevier.

# Dr. Adewale Giwa

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- Awarded the Certificate of Outstanding Contribution in Reviewing, Renewable and Sustainable Energy Reviews Journal, Elsevier.
- Awarded the Certificate of Outstanding Contribution in Reviewing, Applied Energy Journal, Elsevier.
- Awarded the Certificate of Outstanding Contribution in Reviewing by many other journals.
- And so on.

- Co-authored one of the Most Downloaded and Most Cited Articles published in the Q1 Journal, Desalination:
  *J Eke, A Yusuf, A Giwa, A Sodiq. The global status of desalination: An assessment of current desalination technologies, plants and capacity. Desalination 495 (2020), 114633.*
- Co-authored one of the Most Cited Articles published in the Q1 Journal, Process Safety and Environmental Protection:
  *A Giwa, A Yusuf, HA Balogun, NS Sambudi, MR Bilad, I Adeyemi, ... Recent advances in advanced oxidation processes for removal of contaminants from water: A comprehensive review. Process Safety and Environmental Protection 146 (2021), 220-256.*
- Contributed to writing accepted proposals with funding over US$ 3 million.
- Won the Best Poster Award at the 2nd International Conference on Hydrology and Groundwater Expo, Raleigh, North Carolina, USA.
- Awarded the Elf Petroleum and AG Leventis Merit Awards.

**Hands-on Analytical Experience**

Scanning electron microscopy (SEM), transmission electron microscopy (TEM), attenuated total reflectance Fourier transforms infrared spectroscopy (ATR FTIR), Raman spectroscopy, X-ray diffraction (XRD), X-ray fluorescence (XRF), energy dispersive X-ray spectroscopy (EDS), atomic force microscopy (AFM), tensile strength analysis, rheological analysis, Brunauer Emmett and Teller (BET) particle analysis, laser scattering particle size analysis, capillary flow porometry, drop shape contact angle analysis, UV-Vis spectrophotometry, zeta potential analysis, turbidimetry, water quality analysis, thermogravimetric analysis, among others.

**Hands-on Coding & Simulation Experience**

MATLAB, Aspen Plus, Aspen HYSYS, SuperPro Designer, DESASS, SimaPro, Python, HYFRAN, ROSA, RBCA, among others.

**Editorial Responsibilities**

Review Editor, Frontiers in Environmental Chemistry Journal.
(https://loop.frontiersin.org/people/1862757/overview)

**Reviewer Responsibilities**

I have reviewed articles on scientific and technological advances for the journals listed below.

Water Journal, Water Environment Research Journal, Water Process Engineering,

# Dr. Adewale Giwa

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Desalination, Groundwater for Sustainable Development, Chemical Engineering Journal, Journal of Hazardous Materials, Journal of Cleaner Production, Journal of Environmental Management, Heliyon, Fuel, Waste and Biomass Valorization, Applied Energy, Bioresource Technology Reports, Energy Conversion and Management, Energy Conversion and Management X, Energy Conversion and Management, Renewable Energy, Renewable Energy Focus, Renewable & Sustainable Energy Reviews, Science of the Total Environment, International Journal of Sustainable Engineering, International Journal of Environmental Research and Public Health, Separation Science and Technology, Applied Biochemistry and Biotechnology, Cellulose, Clean Energy, Clean Technologies and Environmental Policy, Environment, Development and Sustainability, International Journal of Environmental Science and Technology, Journal of Material Cycles and Waste Management, RSC Advances, Sensors, and many others.

## Professional Memberships

- Member, North American Membrane Society (NAMS)
- Member, Nigerian Society of Chemical Engineers (NSChE)
- Member, Nigerian Society of Engineers (NSE)

## Teaching Philosophy

I believe that teaching occurs when the intended learning outcomes (ILOs) are achieved by students. The ILOs are statements that identify what the students will be able to demonstrate or perform at the end of teaching and learning. My teaching philosophy is that teaching occurs when students are able to achieve the understanding of the content, context of the content, and the performances included in the ILOs through the teaching and learning activities (TLAs) and assessment tasks (ATs) that have been designed/formulated. For teaching to be successful, students should be able to prove their understanding by using their own constructions and reflections to achieve the ILOs. Students should be able to construct their knowledge through the performances of the outcomes stated in the ILOs.

My teaching experience has provided me with the capability that is useful for teaching both core and threshold principles. If the ILOs required the students to ‘design’, I ensured that the students were able to ‘design’ through their TLAs. Also, I ensured that the ATs were focused on the action verb ‘design’. The grading criteria were formulated in a way that the performance of the action verb ‘design’ by the students was the focus. So, learning was achieved because the ILOs, TLAs, and ATs were in agreement. For deep learning, this structure encouraged the students to apply, reflect, hypothesize and generate their own constructions of the transferred knowledge. This constructive alignment has enabled me to achieve transformational teaching – a teaching approach through which the minds and character of the students are transformed and renewed.

Students who are not so motivated can be inspired intrinsically using real-life examples in the TLAs and ATs. Some students find it difficult to understand abstract concepts because they cannot see through the lens of the fundamentals and would need practical examples or day-to-day happenings to activate their understanding. One of the teaching approaches that I have adopted to ensure that students could transit from basic to threshold level of understanding is

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the use of real-world relatable situations to explain abstract concepts for deep learning. In addition, episodic, procedural and semantic memories, which would impart functional skills, can be acquired from engaging activities such as field trips, group discussions, and project-based activities. More engaging ATs, such as one-on-one meetings between the teacher and students, would also ensure that timely and continuous feedback are provided by the teacher.

**Books, Full-length journal articles, book chapters, and articles in conference proceedings**

**Books**

1. **Electrochemical Membrane Technology**

A Giwa
Elsevier (2024).

2. **Data-driven Machine Learning Applications in Thermochemical Conversion Processes**

J Okolie, A Giwa, P Okoye, B Oboirien
Elsevier (2025). In Progress.

**Journal articles**

3. **Enhancing Waste Biomass Pyrolysis: Predictive Insights from Process Simulation Integrated with Interpretable Machine Learning Models**

D Divine, S Hubert, E Epelle, A Ojo, et al.
Fuel 366 (2024), 131346.

4. **Green dispersants for oil spill response: A comprehensive review of recent advances**

A Giwa, B Chalermthai, B Shaikh, H Taher
Marine Pollution Bulletin (2023), 193, 115118.

5. **Desert encroachment and the temporal trends of precipitation in Nigeria's climate zones**

A Giwa, A Yusuf
Journal of Phase Change Materials (2022), 2, 41-51.

6. **Hazardous and emerging contaminants removal from water by plasma-based treatment: a review of recent advances**

M Abuoudah, A Giwa, I Nashef, F AlMarzooqi, H Taher
Chemical Engineering Journal Advances (2022), 12, 100357.

7. **Techno-economic strategies for improving economic viability of β-carotene extraction using natural oil and supercritical solvent: A comparative assessment**

B Chalermthai, A Giwa, N Moheimani, H Taher
Algal Research (2022), 68, 102875.

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8. **Bio-Based Circular Economy and Polygeneration in Microalgal Production from Food Wastes: A Concise Review**

A Giwa, F Abuhantash, B Chalermthai, H Taher
Sustainability (2022), 14 (17), 10759.

9. **Recent developments in hazardous pollutants removal from wastewater and water reuse within a circular economy**

M Ahmed, MO Mavukkandy, A Giwa, M Elektorowicz, E Katsou, O Khelifi, etc.
NPJ Clean Water (2022), 5 (1), 12.

10. **Recent advances in catalytic sulfate radical-based approach for removal of emerging contaminants**

A Yusuf, A Giwa, JO Eniola, HK Amusa, MR Bilad
Journal of Hazardous Materials Advances (2022), 100108.

11. **Updated review on microplastics in water, their occurrence, detection, measurement, environmental pollution, and the need for regulatory standards**
A Yusuf, A Sodiq, A Giwa, J Eke, O Pikuda, JO Eniola, B Ajiwokewu, et al.
Environmental Pollution (2022), 118421.

12. **Effective nutrient removal and metabolite accumulation by C. vulgaris cultivated using digested food waste and brine**

A Giwa, B Chalermthai, N Moheimani, H Taher
Environmental Technology & Innovation (2021), 24, 101935.

13. **Life cycle assessment of bioplastic production from whey protein obtained from dairy residues**

B Chalermthai, A Giwa, JE Schmidt, H Taher
Bioresource Technology Reports (2021), 15, 100695.

14. **Remediation of crude oil-contaminated saline water using novel dispersants from fish and lobster wastes**

M Saleh, M Alhameli, B Chalermthai, A Giwa, H Taher
Results in Engineering (2021), 10, 100236.

15. **A review of emerging trends in membrane science and technology for sustainable water treatment**

A Yusuf, A Sodiq, A Giwa, J Eke, O Pikuda, G De Luca, JL Di Salvo, S Chakraborty
Journal of Cleaner Production (2020), 121867.

16. **The global status of desalination: an assessment of current desalination technologies, plants and capacity.**

J Eke, A Yusuf, A Giwa, A Sodiq
Desalination (2020), 495, 114633.

17. **Novel polyethersulfone-functionalized graphene oxide (PES-fGO) mixed matrix**

Assistant Professor, Chemical and Water Desalination Engineering Program (CWDE), Department of Mechanical and Nuclear Engineering (MNE), University of Sharjah, United Arab Emirates. Phone number: +971 6 505 0973. Email address: agiwa@sharjah.ac.ae.

**membranes for wastewater treatment**

A Giwa, SW Hasan.
Separation and Purification Technology (2020) 241, 116735.

18. **Polygeneration in desalination by photovoltaic thermal systems: A comprehensive review**

    A Giwa, A Yusuf, A Dindi, HA Balogun
    Renewable and Sustainable Energy Reviews (2020), 130, 109946.

19. **Recent advances in advanced oxidation processes for removal of contaminants from water: a comprehensive review**

    A Giwa, A Yusuf, HA Balogun, NS Sambudi, MR Bilad, I Adeyemi, S Chakraborty, S Curcio
    Process Safety and Environmental Protection (2020), 146, 220-256.

20. **3D printing and surface imprinting technologies for water treatment: A review**

    HA Balogun, R Sulaiman, SS Marzouk, A Giwa, SW Hasan
    Journal of Water Process Engineering (2019) 31, 100786.

21. **Membrane bioreactors and electrochemical processes for treatment of wastewaters containing heavy metal ions, organics, micropollutants and dyes: Recent developments**

    A Giwa, A Dindi, J Kujawa
    Journal of hazardous materials (2019) 370, 172-195.

22. **Combined process of electrically-membrane bioreactor and TiO2 aerogel filtration for efficient wastewater treatment**

    A Giwa, SM Jung, J Kong, SW Hasan
    Journal of Water Process Engineering (2019) 28, 107-114.

23. **Novel graphene nanoplatelets-coated polyethylene membrane for the treatment of reject brine by pilot-scale direct contact membrane distillation: An optimization study**

    S Mansour, A Giwa, SW Hasan
    Desalination (2018) 441, 9-20.

24. **Nucleophilic-functionalized β-cyclodextrin-polyethersulfone structures from facile lamination process as nanoporous membrane active layers for wastewater post-treatment: Molecular implications**

    A Giwa, Shadi W Hasan
    Journal of Membrane Science (2018) 563, 914-925.

# Dr. Adewale Giwa

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25. **Selectivity of nanoporous MnO2 and TiO2 membranes for residual contaminants in treated wastewater**

    A Giwa, SM Jung, M Ahmed, W Fang, J Kong, SW Hasan
    Chemical Engineering & Technology (2018) 41, 413-420.

26. **Biomimetic membranes: A critical review of recent progress**

    A Giwa, SW Hasan, A Yousuf, S Chakraborty, DJ Johnson, N Hilal
    Desalination (2017) 420, 403-424.

27. **An investigation of the feasibility of proposed solutions for water sustainability and security in water-stressed environment**

    A Giwa, A Dindi
    Journal of Cleaner Production (2017) 165, 721-733.

28. **Nanoporous hollow fiber polyethersulfone membranes for the removal of residual contaminants from treated wastewater effluent: Functional and molecular implications**

    A Giwa, S Chakraborty, MO Mavukkandy, HA Arafat, SW Hasan
    Separation and Purification Technology (2017) 189, 20-31.

29. **Brine management methods: Recent innovations and current status**

    A Giwa, V Dufour, F Al Marzooqi, M Al Kaabi, SW Hasan
    Desalination (2017) 407, 1-23.

30. **Leaching of PVP from PVDF/PVP blend membranes: impacts on membrane structure and fouling in membrane bioreactors**

    MO Mavukkandy, MR Bilad, A Giwa, SW Hasan, HA Arafat
    Journal of Materials Science (2017) 51 (9), 4328-4341.

31. **The selectivity of nanoporous inorganic membranes for residual contaminants in treated wastewater effluent: The comparative effects of MnO2 and TiO2**

    A Giwa, W. Fang, S.M. Jung, J. Kong, and S.W. Hasan
    Proceedings, Engineering with membranes conference, Singapore (2017).

32. **Molecular and ionic-scale chemical mechanisms behind the role of nitrocyl group in the electrochemical removal of heavy metals from sludge**

    SW Hasan, I Ahmed, AA Housani, A Giwa
    Scientific reports (2016) 6, 31828.

33. **Bio-electrochemical process coupled with MnO2 nanowires for wastewater treatment**

    A Giwa, SM Jung, W Fang, J Kong, SW Hasan
    Int. J. Chem. Mol. Nucl. Mater. Metall. Eng. (2016) 10, 545-548.

# Dr. Adewale Giwa

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34. **A critical review on recent polymeric and nano-enhanced membranes for reverse osmosis**

    A Giwa, N Akther, V Dufour, SW Hasan
    RSC Advances (2016) 6, 8134-8163.

35. **Principles and applications of direct contact membrane distillation (DCMD): a comprehensive review**

    BB Ashoor, S Mansour, A Giwa, V Dufour, SW Hasan
    Desalination (2016) 398, 222-246.

36. **Humidification–dehumidification desalination process driven by photovoltaic thermal energy recovery (PV-HDH) for small-scale sustainable water and power production**

    A Giwa, H Fath, SW Hasan
    Desalination (2016) 377, 163-171.

37. **Recent advances in humidification dehumidification (HDH) desalination processes: Improved designs and productivity**

    A Giwa, N Akther, A Al Housani, S Haris, SW Hasan
    Renewable and Sustainable Energy Reviews (2016) 57, 929-944.

38. **Enhanced sludge properties and distribution study of sludge components in electrically enhanced membrane bioreactor**

    A Giwa, I Ahmed, SW Hasan
    Journal of environmental management (2015) 159, 78-85.

39. **Recent applications of nanomaterials in water desalination: a critical review and future opportunities**

    S Daer, J Kharraz, A Giwa, SW Hasan
    Desalination (2015) 367, 37-48.

40. **Recent advancements in forward osmosis desalination: a review**

    N Akther, A Sodiq, A Giwa, S Daer, HA Arafat, SW Hasan
    Chemical Engineering Journal (2015) 281, 502-522.

41. **Recent improvements in oily wastewater treatment: Progress, challenges, and future opportunities**

    S Jamaly, A Giwa, SW Hasan
    Journal of environmental sciences (2015) 37, 15-30.

42. **Wind and geothermal energy in desalination: a short review on progress and sustainable commercial processes**

    A Abusharkh, A Giwa, S Hasan
    Industrial Engineering and Management (2015) 4 (175), 2169-0316.1000175.

# Dr. Adewale Giwa

Assistant Professor, Chemical and Water Desalination Engineering Program (CWDE), Department of Mechanical and Nuclear Engineering (MNE), University of Sharjah, United Arab Emirates. Phone number: +971 6 505 0973. Email address: agiwa@sharjah.ac.ae.


43. **Life cycle assessment of bioplastic production from whey protein obtained from dairy residues**

B Chalermthai, A Giwa, JE Schmidt, H Taher
Bioresource Technology Reports (2021) 15, 100695.

44. **Improving the economic feasibility of biodiesel production from microalgal biomass via high-value products coproduction**

F Khanum, A Giwa, M Nour, S Al-Zuhair, H Taher
International Journal of Energy Research (2020), 44 (14), 11453-11472.

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