

# **Dr. Michael O. Eze (Ph.D. Dr.rer.nat.)**

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## **Education and appointments**

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### **Missouri University of Science and Technology, Rolla, MO, USA**

*Assistant Professor of Bioanalytical & Environmental Chemistry*, August 21, 2023 – Present

- Head of the Metabolomics and Environmental Toxicology Laboratory (Eze Group)
- Developing MS-based metabolomics methods for animal and plant disease diagnosis
- Characterizing organismal exposure to, and toxicity of environmental contaminants
- Innovating ecofriendly remediation approaches for organic and inorganic pollutants
- Teaching and supervising PhD students and postdoctoral scholars

### **University of California, Davis, CA, USA**

*Postdoctoral Fellow, Analytical Chemistry & Metabolomics*, April 1, 2022 – September 14, 2023

- Mass spectrometry-based profiling of metabolomic content of complex samples (including breath, serum, blubber, plant tissue, soil, and water)
- Investigating the fate, transport, and accumulation of persistent organic pollutants (POPs) in aquatic organisms such as whales and dolphins in St Kitts Islands
- Identifying biomarkers of citrus HLB disease, and assessing the effectiveness of therapeutics (in collaboration with the UF, Texas A&M, and Bayer R&D)

### **Macquarie University, Sydney, Australia**

*Ph.D. in Analytical & Organic Geochemistry*, August 2021

- Environmental analysis for contaminant identification and quantification
- Examined the effect of physicochemical properties on pollutant transport
- Dose-response analysis of contaminant phytotoxicity using R language

### **Georg-August University of Goettingen, Germany**

*Dr.rer.nat. in Biology (German Ph.D. equivalent) with Magna cum laude*, June 2021

- Overall grade of 1.00 (the highest possible grade in the German grading system)
- Developed eco-friendly methods for the remediation of environmental pollutants
- Supervised bachelor and master's students

### **Abubakar Tafawa Balewa University, Bauchi, Nigeria**

*PGDip. in Management*, June 2016

- Human resources management including supervision and teambuilding
- Budgeting, financial and project management principles

### **Abubakar Tafawa Balewa University, Bauchi, Nigeria**

*M.Sc. in Analytical Chemistry*, February 2015

- Phytoremediation of heavy metals, and assessment of mobility in vegetable plants

### **Usmanu Danfodiyo University, Sokoto, Nigeria**

*PGDip. in Education with Distinction*, March 2012

- Acquisition & demonstration of pedagogical skills (Licensed by NESAS Australia)

### **University of Nigeria, Nsukka, Nigeria**

*B.Sc. (Honors) in Pure and Industrial Chemistry*, February 2006

- Analytical, environmental, organic, inorganic, physical, and polymer chemistry

## Relevant instrumentation and data analytical skills

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- Operation and maintenance of GC-MS, GC-QQQ, LC-MS, and LC-QToF
- Chemometric analysis on MS datasets using regression and discriminant techniques to test diagnostic capabilities of biological assays (PCA, PLS-DA, nMDS)
- Dose-response analysis in ecotoxicology using R language and MATLAB
- Science communication, grant writing and interdisciplinary research

## Publications (\*Corresponding author; †Contributed equally)

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1. \*Eze, M.O. and Amuji, C.F. (2024). Elucidating the significant roles of root exudates in organic pollutant biotransformation within the rhizosphere. *Scientific Reports*, **14**, 2359. doi.org/10.1038/s41598-024-53027-x.
2. †McCartney, M.M., †Eze, M.O., Borrás, E., Edenfield, M., Batuman, O., Manker, D.C., da Graca, J.V., Ebeler, S.E. and \*Davis, C.E. (2023). A metabolomics assay to diagnose citrus Huanglongbing (HLB) disease and to aid assessment of treatments to prevent or cure infection. *Phytopathology*, **114**, 84-92. doi.org/10.1094/PHYTO-04-23-0134-R.
3. Ishieze, P.U., Amuji, C.F., Ugwuoke, K.I., Baiyeri, P.K. and \*Eze, M.O. (2023). Comparative efficacy of systemic and combination fungicides for the control of Alternaria leaf spot of cabbage. *Applied Microbiol.*, **3**, 906-914. doi.org/10.3390/applmicrobiol3030062.
4. Udume, O.A., Abu, G.O., Stanley, H.O., Vincent-Akpu, I.F., Momoh, Y. and \*Eze, M.O. (2023). Biostimulation of petroleum-contaminated soil using organic and inorganic soil amendments. *Plants*, **12**, 431. doi.org/10.3390/plants12030431.
5. \*Eze, M.O., Thiel, V., Hose, G.C., George, S.C. & Daniel, R. (2022). Bacteria-plant interactions synergistically enhance biodegradation of diesel fuel hydrocarbons. *Communications Earth & Environment*, **3**, 192. doi.org/10.1038/s43247-022-00526-2.
6. \*Eze, M.O. and George, S.C. (2022). The potential of oxygenates to increase the risk of exposure to polycyclic aromatic hydrocarbons through groundwater contamination. *Water*, **14**, 739. doi.org/10.3390/w14050739.
7. \*Eze, M.O., Thiel, V., Hose, G.C., George, S.C. and Daniel, R. (2022). Enhancing rhizoremediation of petroleum hydrocarbons through bioaugmentation with a plant growth-promoting bacterial consortium. *Chemosphere*, **289**, 133143. doi.org/10.1016/j.chemosphere.2021.133143.
8. \*Eze, M.O., George, S.C. and Hose, G.C. (2021). Dose-response analysis of diesel fuel phytotoxicity on selected plant species. *Chemosphere*, **263**, 128382. doi.org/10.1016/j.chemosphere.2020.128382.
9. \*Eze, M.O., Hose, G.C., George, S.C. and Daniel, R. (2021). Diversity and metagenome analysis of a hydrocarbon-degrading consortium from asphalt lakes located in Wietze, Germany. *AMB Express*, **11**, 89. doi.org/10.1186/s13568-021-01250-4.
10. \*Eze, M.O. (2021). Metagenome analysis of a hydrocarbon-degrading bacterial consortium reveals the specific roles of BTEX biodegraders. *Genes*, **12**, 98. doi.org/10.3390/genes12010098.
11. Eze, M.O., Lütgert, S.A., Neubauer, H., Balouri, A., Kraft, A.A., Sieven, A., \*Daniel, R. and Wemheuer, B. (2020). Metagenome assembly and metagenome-assembled genome sequences from a historical oil field located in Wietze, Germany. *Microbiology Resource Announcements*, **9**, 21. doi.org/10.1128/MRA.00333-20.
12. \*Eze, M.O., Hose, G.C. and George, S.C. (2020). Assessing the effect of diesel fuel on the seed viability and germination of *Medicago sativa* using the event-time model. *Plants*, **9**, 1062. doi.org/10.3390/plants9091062.
13. \*Eze, M.O. and George, S.C. (2020). Ethanol-blended petroleum fuels: implications of co-solvency for phytotechnologies. *RSC Advances*, **10**, 6473-6481. doi.org/10.1039/C9RA10919F.

14. \*Eze, M.O. (2015). Effect of solid waste source (dumpsite type) on heavy metal contaminations in urban soils of Bauchi, Nigeria. *American Chemical Science Journal*, **9**, 1-14. doi.org/10.9734/ACSJ/2015/18039.
15. \*Eze, M.O. and Ekanem, E.O. (2014). Bioaccumulation and mobility of cadmium (Cd), lead (Pb) and zinc (Zn) in green spinach grown on dumpsite soils of different pH levels. *Bulletin of Environment Pharmacology and Life Sciences*. **4**, 85-91.
16. \*Eze, M.O. (2014). The relationship between soil physico-chemical properties and concentrations of selected heavy metals (Cd, Pb, Ni, Fe, Zn) in *Amaranthus hybridus*. *Australian Journal of Chemistry*.

## Selected conference presentations (‡Oral presentation)

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- ‡Eze, M.O., McCartney, M.M., Borrás, E. and Davis, C.E. (2023). *Metabolomics predictors of vigor in citrus and their application to analyze therapeutic efficacy against Huanglongbing (HLB)*. 5<sup>th</sup> Annual Metabolomics Association of North America (MANA) Conference. Columbia, MO, USA. October 23-27, 2023.
- ‡McCartney, M.M., Eze, M.O., Borrás, E. and Davis, C.E. (2023). *Use of metabolomics to diagnose plant diseases and to evaluate potential therapeutics or preventions: a citrus HLB case study*. 12<sup>th</sup> International Congress of Plant Pathology. Lyon, France. August 20-25, 2023.
- ‡Eze, M.O. (2022). *Metagenome analysis of a hydrocarbon-degrading bacterial consortium from a historic oil site in Wietze, Germany*. ASM Microbe, Washington D.C., USA. June 9-13, 2022.
- ‡Eze, M.O. (2021). *Metagenomic insight into the metabolic activities of potential BTEX-degrading populations*. 30<sup>th</sup> IMOG, Montpellier, France. September 12-17, 2021.
- ‡Eze, M.O. (2021). *Rapid Fire Presentation: Plants and Microbes Unite to Clean Up Oil Spills*. Australian Earth Sciences Convention (Online). February 9-12, 2021.
- ‡Eze, M.O., George, S.C. and Hose, G.C. (2020). *Modelling hormesis in rhizoremediation of petroleum contaminated sites*. AAPG 2020 Annual Convention and Exhibition (Online). September 29 – October 1, 2020.
- ‡Eze, M.O., George, S.C., Hose, G.C., Daniel, R. and Wemheuer, B. (2020). *Metagenomic insight into a diesel-degrading consortium for the bioremediation of diesel fuel-contaminated sites*. RSC EnvChem2020 Conference. July 9-10, 2020.
- ‡Eze, M.O., George, S.C. and Hose, G.C. (2019). *The potential of *Medicago sativa* for microbial-enhanced phytoremediation of diesel fuel contaminated sites*. AAPG 2019 International Conference and Exhibition (ICE), Buenos Aires, Argentina. August 27-30, 2019 (awarded the *Best International Student Presenter*).
- ‡Eze, M. and Ekanem, E. (2019). *Potential of *Amaranthus hybridus* for remediation of heavy metals*. Goldschmidt 2019 Conference, Spain. August 18-23, 2019.
- Eze, M.O. and George, S.C. (2019). *Ethanol-blended fossil fuel: is reduction of atmospheric pollution the only concern?* SETAC Europe 29<sup>th</sup> Annual Meeting, Helsinki, Finland. May 26-30, 2019.
- ‡Eze, M. and George, S. (2018). *Effect of ethanol addition on vertical migration of diesel fuel: implications for phytoremediation*. 20<sup>th</sup> Australian Organic Geochemistry Conference (AOGC), Canberra, Australia. December 3-7, 2018.
- ‡Eze, M.O. (2018). *The potential of plant growth-promoting rhizobacteria to enhance phytoremediation of diesel fuel-contaminated sites*. HDR Conference, Macquarie University, Sydney, Australia. June 2018.

## Invited (technical) talks

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- Eze, M.O. (2022). *Saving our planet through science*. Department of Earth & Planetary Sciences, University of California Davis, Davis, California, USA.

- **Eze, M.O.** and McCartney, M. (2022). *Metabolomics: a window into cellular and biochemical processes*. Bayer Crop Science, Sacramento, California, USA.
- **Eze, M.O.** (2019). Petroleum Exploration Society of Australia (PESA) NSW March 2019 Technical Meeting. The Castlereagh Boutique Hotel, Sydney, Australia.

## Nontechnical science communication-based presentations

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- 2022: ASM Microbe Rapid Fire Presentation
- 2021: Runner-Up, Australian Earth Science Convention Rapid Fire Presentation
- 2019: 1<sup>st</sup> Place Award for Early Career Researcher Prize, Sparrow, United Kingdom (I was the winner among finalists from more than 70 countries).
- 2018: Faculty Runner-Up, 3MT Competition, Macquarie University, Sydney
- 2018: 1<sup>st</sup> Place Award, 3MT Competition, Earth & Env. Sciences, Macquarie University
- 2018: Continental Finalist, Falling Walls Lab Australia

## Research grants, awards, and recognitions (>US\$ 700,000)

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- 2024: Career MODE Fellow, Columbia University Career MODE Program, New York
- 2023: “Extraordinary Professor” recognition for sustained national and international acclaim.
- 2023: Early Career Travel Award by the Metabolomics Association of North America (\$800)
- 2023: Travel Grant for Early Career Scientists, Royal Society of Chemistry, London, UK (\$650)
- 2023: Sponsored Open Access Publishing Fee for Invited Articles in *Plants* (Q1) (\$2,500)
- 2023: Sponsored Open Access Publishing Fee for Invited Articles in *Applied Microbiology* (\$1,100)
- 2022: *Environments* Journal Travel Award, MDPI, Basel, Switzerland (\$500)
- 2022: Postdoctoral Fellowship, University of California, Davis, US (>\$200,000)
- 2022: Researcher Development Grant, Royal Society of Chemistry, London, UK (\$700)
- 2021: Merrill W. Haas Memorial Grant, American Association of Petroleum Geologists (\$3,000)
- 2021: Researcher Development Grant, Royal Society of Chemistry, London (\$350)
- 2021: Australian Earth Science Convention Grant, Australia (\$500)
- 2020: Bernold M. Hanson Memorial Environmental Grant, AAPG Foundation, US (\$3,000)
- 2019: Otto Bayer Fellowship, Bayer Science & Education Foundation, Germany (\$21,200)
- 2019: Carlos Walter Campos Memorial Award for the Best International Student Paper, US (\$500)
- 2019: Travel Grant for PhD Students & Early Career Scientists, Royal Society of Chemistry (\$850)
- 2019: Postgraduate Research Fund, Macquarie University, Sydney, Australia (\$5,000)
- 2019: Cotutelle Research Excellence Scholarship, Macquarie University, Sydney (\$214,792)
- 2019: Travel Grant, European Association of Geochemistry (\$2,680)
- 2019: DAAD Scholarship for Cotutelle PhD, German Academic Exchange Service (\$48,850)
- 2019: 29<sup>th</sup> Annual Meeting Grant, Society of Environmental Toxicology & Chemistry (\$500)
- 2018: Tertiary Institution Research Grant, PESA Australia (\$1,000)
- 2017: Research Training Program (iRTP) Scholarship, Australian Government (\$200,876)

## Featured popular media

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- Nature Earth & Environment Community “Behind the Paper” Blog article: <https://earthenvironmentcommunity.nature.com/posts/bacteria-plant-interactions-synergistically-enhance-biodegradation-of-diesel-fuel-hydrocarbons>
- Royal Society of Chemistry, London: <https://blogs.rsc.org/ra/2020/03/25/rsc-advances-hot-articles-a-feature-interview-with-michael-eze>
- AAPG International Award: <https://www.aapg.org/about/aapg/overview/honors-and-awards/association/student-international-awards/campos>
- Sparrho, United Kingdom: <https://digest.sparrho.com/community/introducing-our-october-500-researcher-prize-winner>

- Sparrow Science, London, United Kingdom: Feature Interview  
<https://www.sparrow.science/plants-and-microbes-unite-to-clean-up-oil-spills>
- Australian Academy of Science (AAS): <https://www.science.org.au/news-and-events/events/international-events/falling-walls-lab-australia>

## Memberships and professional affiliations

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- Royal Society of Chemistry
- American Chemical Society
- Metabolomics Association of North America
- Society of Environmental Toxicology and Chemistry
- American Society for Microbiology
- New South Wales Education Standards Authority

## International committees/Expert panel

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- Expert Reviewer, Royal Society of Chemistry Research Fund & ECR Grants, UK.
- Expert Panel, National Science Centre (NCN) Poland OPUS (NCN ID: 2022-234055)  
I served in Panel NZ8 of the NCN, which is the largest grant-awarding body of the Polish Government, similar to National Science Foundation (NSF) panels in the US.
- Organizing Committee (*Program and Abstracts*), HDR Conference, Sydney, Australia. November 2018.

## Leadership and mentorship activities

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- *ACS Chair-Elect*, American Chemical Society South Central Missouri Section.
- *Higher Degree Research Mentor*, Macquarie University, Sydney, Australia.

## Peer review activities

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- *Nature Scientific Reports* (IF: 4.6; Publisher: Nature Portfolio)
- *RSC Advances* (IF: 4.036; Publisher: Royal Society of Chemistry)
- *Royal Society Open Science* (IF: 3.653; Publisher: The Royal Society)
- *Environmental Science & Pollution Research* (IF: 5.190; Publisher: Springer Nature)
- *Microbial Ecology* (IF: 4.192; Publisher: Springer Nature)
- *Science of the Total Environment* (IF: 10.753; Publisher: Elsevier)
- *Chemosphere* (IF: 8.800; Publisher: Elsevier)
- *Journal of Hazardous Materials* (IF: 13.600; Publisher: Elsevier)
- *Environmental Pollution* (IF: 8.900; Publisher: Elsevier)
- *Water Research* (IF: 13.400; Publisher: Elsevier)
- *Water* (IF: 3.530; Publisher: MDPI)
- *International Journal of Environmental Research & Public Health* (IF: 4.614)
- *Agronomy* (IF: 3.949; Publisher: MDPI)
- *Remediation* (IF: 2.087; Publisher: John Wiley & Sons)
- *3 Biotech* (Publisher: Springer Nature)
- *Toxics* (IF: 4.472)