MUHAMMAD AYOUB *PHD, REP, TS*

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PROFESSIONAL SUMMARY

Currently, I am working as a Visiting Professor of Practice at CHME, New Mexico State University, NM, USA, where I engage with Unit Operation Lab courses and serve as an advisor for the AIChE student chapter. Additionally, I am available to work with students to perform demonstrations at outreach events. Innovative Chemical and Environmental Engineering professional with Ph.D. in Chemical Engineering and over a decade of research and teaching experience. Specializing in biomass conversion, biofuel production, catalysis, and green technologies, I have a strong track record of publishing in high-impact journals and securing research funding. My interdisciplinary research focuses on sustainable materials, circular bioeconomy, and catalytic processes. I am passionate about advancing chemical and bioengineering education through innovative teaching methods and mentoring undergraduate and graduate students.

CORE COMPETENCIES

- Grant Writing & External Funding Acquisition
- Support SDGs, Air Pollution control with Safety and Prevention for Global Warming, and CO_2 capture and
- Biomass Preprocessing for Biofuel Production
- Chemical Engineering Education & Course Instruction
- Active & Cooperative Learning
- Cross-Disciplinary Collaboration Laboratory & Design Course
- Project development and lifecycle
- Collaborative Research & Multidisciplinary Projects
- Research Program Development
- Recycling of Biobased Composites for Sustainable Circular Bioeconomy
- Catalysis, Green Technology, Green Fuel production, Biomass Converging
- Processing, Sustainable and Renewable energy, Bio & Environmental Engineering

EDUCATION

- **PHD** in CHEMICAL ENGINEERING
  University of Sains Malaysia, Penang, Malaysia (2013)
  Dissertation Focus: "Green Catalysts for Sustainable Fuel Production and Biomaterials for Green Technology"
  MSE in ENVIRONMENTAL ENGINEERING
  Kwangwoon University, Seoul, South Korea (2010)
  Dissertation Focus: Sustainable Environment, Biomaterials and Pollution Control
- **BSE** in CHEMICAL ENGINEERING
  Institute of Chemical Engineering & Technology, Punjab University, Lahore, Pakistan (2002)
  Dissertation Focus: Chemical Engineering and Sustainable Environment

ACADEMIC AND RESEARCH EXPERIENCE

Visiting Professor of Practice, Department of Chemical & Materials Engineering (CHME),
New Mexico State University (NMSU), Las Cruces, NM 88003, USA *(August 2025 - Present)*

- Teaching unit operations laboratory courses CHME 323L & CHME 423L
- Advisor for AIChE Student Chapter to mentor work-study students and guide outreach demonstrations
- Participate in local, regional, and state activities for outreach as appropriate, work with the Outreach office to perform activities with them, visit high schools, attend recruiting fairs, robotics competitions, high school science fairs, and connect with social activities.
- Serve as Manager of the Unit Operations Laboratory

Lab Engineer | Lab Coordinator,
GENVIEW DX, Houston, TX, USA *(Dec 2024 – August 2025)*
Developed technical specifications for lab equipment and components, including LC, GC, TGA, ICP, TGA, SEM, TEM, compressors, high-pressure gaseous storage, and electrical machines.

- Conducted Toxicology testing and in-process inspections to ensure compliance with standards.
- Provided support for permitting processes, including reviewing and updating permit limits.
- Led the creation of installation and maintenance manuals, ensuring documentation for operations.
- Managed relationships with supportive team and engineering disciplines to ensure process success

AI Expert Contributor: Engineering (Task-Based) at Snorkel AI, Inc.
HireArt, Inc 135 W 29th St. Suite 500, New York NY 10001, USA (*Sep 2024 – August 2025)*

- The goal of Job task is to review aspects of question-and-answer quality for a given set of question/answer QA pairs for a given topic. Parallelly, estimate that each QA pair
- To review questions and their answers generated by other experts in batches and their answers validity and properly logic according to engineering teaching and learning expertise.

Associate Professor in Chemical Engineering
Universiti Teknologi PETRONAS, Malaysia (*February 2014 – June 2024*)

- Conducted interdisciplinary research on biomass conversion, bio-based materials, and biofuel production, contributing to advancements in circular bioeconomy systems.
- Supervised and mentored over 100 undergraduate, master's, and Ph.D. students, focusing on biobased materials and sustainable energy technologies.

- Secured over $1 million in research funding for projects related to biofuel production, catalysis, and sustainable energy systems.
- Developed and taught courses on thermodynamics, reaction engineering, and sustainable energy systems, integrating hands-on, problem-based learning methods.
- Published over 150 peer-reviewed journal articles and presented research findings at major international conferences. Led research in biomass conversion, biofuel production, and biobased composite recycling for sustainable energy and circular bioeconomy systems.
- Developed and optimized catalytic processes for converting biomass into biofuels and valuable chemicals, focusing on waste-to-energy initiatives.
- Supervised Ph.D. and M.S. students in projects related to biomass preprocessing, green hydrogen production, and biobased materials.
- Integrated Chemical Engineering topics into undergraduate and graduate curricula, fostering interdisciplinary collaboration in green-based technologies.

Research Fellow in Sustainable Energy

Universiti Sains Malaysia, Penang, Malaysia *(June 2010 – September 2013)*

- Conducted research on sustainable energy systems, including the development of bio-based catalysts and the recycling of biobased composites.
- Investigated methods to enhance the performance of biocomposite materials for biodegradability and reusability in industrial applications.
- Presented findings at international conferences, advancing the field of bioengineering and sustainable materials.

RESEARCH & SCHOLARLY ACTIVITIES

Research Interests

- **Biomass Conversion:** Developing innovative processes for converting biomass into biofuels and sustainable chemicals.
- **Catalytic Reaction Engineering:** Optimizing catalytic processes for biofuel & hydrogen production and CO_2 capture & utilization.
- **Circular Bioeconomy:** Developing recycling systems for biobased materials to promote sustainable production cycles.
- **Green Energy Systems:** Exploring H_2 production and sustainable energy solutions for industrial and environmental applications.
- **Biofuel Production**: Investigating advanced catalytic processes for converting waste biomass into clean, renewable fuels.
- **CO_2 Capture and Utilization**: Developing innovative technologies for carbon reduction via CO_2 capture and utilization.
- **Circular Bioeconomy**: Developing sustainable systems for biobased composite recycling to promote closed-loop production processes.

Research Focus Grants & Funding

Highly recognized National and International 23 Projects granted and effectively completed on time in the field of Biomaterials, Biofuel, Biomass Conversion, Renewable Energy, Sustainable Bioengineering and Green Catalytic Technology. Principal Investigator on research projects totalling over $1 million in external funding, including national and international grants for biomanufacturing, drug delivery, and sustainable energy research. Successful proposals on bio-based materials for biotechnology applications and biocompatible catalysts for green energy production. Selected latest Projects completed;

- Decarbonising Malaysia's Fisheries Sector: Evaluation on technical viability, environmental performance and carbon footprint for local fishing boats using waste cooking oil biodiesel; National Collaborative Research Fund Grant # 015MD0-190; Sep 2023 - Aug 2024; RM 400,000.00 (UTP-UNiTEN - UNiKL Malaysia, Principal Investigator)
- Optimization of palm oil mill effluent (POME) conversion to FAME over modified clay catalyst under microwave irradiation; International Collaborative Research ICRF International Grant # 015ME0-271; March 2022 - March 2024; RM 49,000.00 (Japan and Malaysia, Principal Investigator)
- Green hydrogen fuel from sorption-enhanced steam reforming of waste glycerol over Mg-doped, Ni-based eggshell catalyst; YUTP-FRG National Grant # 015LC0-331; May 2022 - April 2024; RM 195,000 (Malaysia, Principal Investigator)
- The utilization of dairy waste for valuable fuel and fuel additive; International Collaborative Research ICRF International Grant # 015ME0-359; March 2023 - Feb 2024; RM 23,000.00 (Indonesia and Malaysia, Principal Investigator)
- Green hydrogen fuel from sorption-enhanced steam reforming of waste glycerol over Mg-doped, Ni-based eggshell catalyst; YUTP Grant # 015LCO-861; Aug 2021 - Aug 2024; RM 195,000 (Malaysia, Principal Investigator)

Patents

Intellectual Property and Copywrite in the field of Biofuel biomaterial and Catalysis for Patent filed (4) and Copyright filed (2) and received many innovation awards.

Selected Publications

The established research work since 2011 up till now published in the form of peer-reviewed books (2) and book chapters (10), highly recognized peer-reviewed journal articles (150) and other non-peer reviewed journal articles (12), reports and conference proceedings (27). The selected Books, Book Chapters, ISI Journal publications and international conference papers with high citation record for research publications 4100+ with H-index 35 and i-10-index 82. Selected latest Publications:

- A Comparative Study of Eggshell and Sorbent-Based Catalysts for Biomanufacturing Processes, Journal of Sustainability (2023).
- Influence of Co3O4-based Catalysts on Drug Delivery System Efficiency, Environmental Science & Pollution Research (2023).
- Modelling CO2 Adsorption on Surface-Functionalized Biomaterials, Processes Journal (2023).
- Development of lignin based heterogeneous solid acid catalyst derived from sugarcane bagasse for microwave assisted transesterification of waste cooking oil, Biomass and Bioenergy (2022)
- Production of Fuel Additive Solketal via Conversion of Biodiesel-Derived Glycerol, Industrial & Engineering Chem. Research (2021)
- Catalytic Activity of Intercalated Montmorillonite Clay for Glycerol Conversion to Oligomers via Microwave Irradiation, Journal of the Japan Institute of Energy (2020)

*Complete listed here in clicking link. https://scholar.google.com.my/citations?user=QKH0iCUAAAAJ&hl=en

Research Supervision

Successfully supervised over 100 students across PhD, MS, and undergraduate levels, contributing to the completion of research projects in collaboration with international institutions.

Collaborations

Led research projects, Co-supervision, Co-organiser of Conferences, and academic exchanges with universities and institutions across Malaysia, Japan, Indonesia, Kazakhstan, South Korea, and the UK.

SERVICE AND LEADERSHIP

Committee Member:
Curriculum Development Committee, Chemical Engineering Department, Universiti Teknologi PETRONAS.
Advisor: Undergraduate Research Program, fostering interdisciplinary research among students in chemical and materials engineering.
Community Outreach:
Led educational workshops on sustainable energy practices for local communities and schools.
Professional Memberships:

- Senior member of American Institute of Chemical Engineering (AIChE), USA
- Senior Member of International Association of Carbon Capture (SIMCC), UK
- Associate Member of Institute of Chemical Engineers (AMIChemE), UK
- Affiliate Member of Energy Institute (IE), UK
- Professional Technologist of Malaysian Board of Technologist (MBOT), Malaysia
- Professional Engineer of Pakistan Engineering Council (PEC), Pakistan

TEACHING EXPERIENCE AND COURSES DELIVERY

Undergraduate Courses:

- Engineering Thermodynamics I & II – Teaching Evaluation: 6.7/7.0
- Health, Safety, and Environment – Teaching Evaluation: 6.5/7.0
- Reaction Engineering – Teaching Evaluation: 6.4/7.0
- Separation Processes – Teaching Evaluation: 4.6/5.0
- Sustainable Energy Systems– Teaching Evaluation: 4.7/5.0
- Heat Transfer and Mass Transfer– Teaching Evaluation: 4.6/5.0
- Environmental Chemical Engineering – Teaching Evaluation: 4.9/5.0
- Material Chemical Engineering – Teaching Evaluation: 4.8/5.0

Graduate Courses:

- Advanced Biomass Conversion– Teaching Evaluation: 4.8/5.0
- Optimization of Chemical Engineering – Teaching Evaluation: 4.5/5.0
- Bioengineering for Renewable Energy– Teaching Evaluation: 4.6/5.0
- Environmental Risk & Impact Assessment – Teaching Evaluation: 4.5/5.0

Online Courses MOOC/ODL:

- Virtual/Online Environmental Chemical Engineering – Teaching Evaluation: 4.7/5.0
- Human Factor Process Safety (Virtual) – Teaching Evaluation: 4.7/5.0
- Health, Safety, and Environment (MOOC)– Teaching Evaluation: 4.8/5.0

Laboratory Courses: Designed and supervised lab courses focused on practical applications of Unit operation, Reaction Engineering, Kinetics, Thermodynamics and Environmental for chemical engineering principles.
Innovative Teaching Methods:

- Implemented Problem-Based Learning (PBL), Active Learning (AL), and Flipped Classroom (FL) methodologies to enhance critical thinking and student participation.
- Certified in Online Distance Learning (ODL), Active Learning (AL), and Cooperative Learning (CL) techniques, ensuring the adoption of modern teaching methods in all course deliveries.

Certifications:

- Certified Trainer for Online Distance Learning (ODL) Modules
- Certified Trainer in Active Learning and Cooperative Learning with Flipped Classroom and Problem-Based Learning methodologies
- Certified Trainer for short courses delivery and webinar conduction

PROFICIENCY

- **SOFTWARE:** COMSOL Multiphysics (FEMLAB), MATLAB, Chem CAD, Aspen PLUS, HYSIS, MS Office, MS Visio, Web design Software; Fair Experience: Mathematica, Simulink, Design of Experiments (DOE) and Computer aided designing (AUTOCAD); Good command on Chem Draw, Table Curve, Polymath, Origin and Sigma Plot.
- **LANGUAGES:** English: Fluent in Speaking, Reading and Writing; Urdu/Hindi/Punjabi: Fluent in Speaking, Reading and Writing; Korean & Bahasa Malaya- Basic level in Speaking, Reading and Writing.

AWARDS & HONORS

- Listed in the Stanford/ Elsevier Top 2% of Scientists Worldwide (2023 - 2025)
- Multiple Silver and Bronze Medals in international innovation and research exhibitions
- Gold Medal for International Innovation Project under Sustainable Stars in 5TH SUSTAINABILITY CHALLENGE, Malaysia, 2023
- Silver Medal for International Innovation Project in MTE SDG 2023, Penang, Malaysia, 2023
- Silver Medal for Poster Presentation in TLIF Exhibition 2022, UTP, Malaysia, 2022
- Bronze Medal in Sirim Exhibition (Si2TE2022), Kulim, Malaysia, 2022
- Silver Medal for Poster Presentation in TLIF Exhibition 2021, UTP, Malaysia, 2021
- Gold Medal for Best Paper presentation Award in International Conference Biosciences ICBS, 2021
- Gold Medal for Poster Presentation in TLIF Exhibition 2020, UTP, Malaysia, 2020
- Silver Medal for Poster Presentation in TLIF Exhibition 2019, UTP, Malaysia, 2019
- Silver Medal in 5th International Education Exhibition (I-PHEx 2018), Kuala Lumpur, Malaysia, 2018
- Best Teaching Award under Centre of Education for Teaching and Learning, UTP Q-Day 2018
- Best Researcher Award nominee for MA2 categories, UTP Q-Day 2018
- Best Teaching Award nominee for Effective Education Delivery, UTP Q-Day 2017
- 37th SEDEX Gold Medal Award 2015 (UTP, Malaysia) for supervision of FYP student, 2016
- 36th SEDEX Bronze Medal Award 2015 (UTP, Malaysia) for supervision of FYP student, 2015
- Winner for SANGGAR SANJUNG Award (USM, Malaysia) for Best Publication, 2014 SKILLS