

Dr. Haydar A. S. Aljaafari

Ph.D. Chemical & Biochemical Engineering

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Baghdad, Iraq

PROFESSIONAL PROFILE

Chemical engineer with a Ph.D. from the University of Iowa (2022) and more than a decade of teaching, research, and academic-service experience across Iraqi and **U.S.** institutions. Currently a full-time faculty member in the Chemical Engineering Department at the University of Technology (Baghdad), part-time lecturer in Mass Transfer at Al-Mustaqbal University, and holder of a courtesy appointment at the University of Iowa. Author of more than 25 peer-reviewed, Scopus-indexed journal articles concentrated in heat and mass transfer, reactor and fluidization systems, thermal/energy processes, and applied nanomaterials. Trained in process safety by leading industry and national bodies, with hands-on experience in process simulation (Aspen HYSYS) for refining and separation systems. Seeking a part-time faculty appointment in the Department of Chemical Engineering and Oil Refining to contribute to teaching, supervision, laboratory instruction, and research.

AREAS OF TEACHING & RESEARCH EXPERTISE

Aligned with the department's stated needs:

- Heat & Mass Transfer – core doctoral focus; extensive publication record in convective heat transfer, heat exchangers, and fluidized/spouted-bed thermal behavior; taught Mass Transfer at university level.
- Reactor Design & Fluidization – published research on fluidized-bed, spouted-bed, and ebullated-bed reactors and on catalytic reforming reactor performance.
- Refining & Process Simulation – Aspen HYSYS design of distillation/vacuum-distillation and separation units; publications in Petroleum Chemistry and petroleum-related corrosion.
- Process Safety & Environment – formal training by DOW Chemical (Process Safety) and the **U.S.** Department of State; established laboratory safety protocols; research on emissions reduction and water treatment.
- Chemical Engineering Fundamentals & Separation Processes – mass transfer, membrane separation/ultrafiltration, and process equipment design.

EDUCATION

Ph.D., Chemical & Biochemical Engineering

May 2022

University of Iowa, Iowa City, IA, USA — GPA 3.9 / 4.00

M.Sc., Chemical Engineering

University of Technology, Baghdad, Iraq — Ranked 1st among 8 graduates

B.Sc., Chemical Engineering

University of Technology, Baghdad, Iraq — Ranked 2nd among 288 graduates

TEACHING & ACADEMIC APPOINTMENTS

University of Technology – Chemical Engineering Department, Baghdad, Iraq Aug 2022 – Present

Faculty Member (full-time)

- Teach undergraduate chemical engineering courses; prepare lectures, assessments, and course materials.
- Supervise senior students' graduation-project seminars within the department.
- Implement standardized operating protocols and laboratory safety regulations for departmental labs.
- Lead the Unit of Scientific Affairs – managing research activities, collaborations, scientific events, and publication strategy.

- Supervise student teams competing in the AIChE Chem-E-Car international competition.
- Established the international Three-Minute Thesis (3MT) competition (200 PhD/MSc participants; 50 faculty coordinated) and co-established the 1st International Engineering Technology and Applied Science (IETAS 2024) Conference.

Al-Mustaqbal University – Chemical Engineering, Iraq

Recent years (part-time)

Part-time Lecturer – Mass Transfer

- Delivered the full Mass Transfer course, one of the more demanding courses in the chemical engineering curriculum – including lectures, tutorials, examinations, grading, and all course requirements.

University of Iowa – Chemical & Biochemical Engineering, Iowa City, IA

Present

Courtesy Appointment (Nuxoll Laboratory)

- Ongoing research collaboration on thermal eradication of biofilms and related biomedical-interface work.

RESEARCH EXPERIENCE

Graduate Research Assistant – University of Iowa, Iowa City, IA

Aug 2014 – May 2022

- Investigated thermal shock, alone and combined with antibiotics, for eliminating biofilms on medical-device surfaces; studied bacterial community response to heat.
- Prepared and characterized iron-oxide nanoparticles for remote inductive heating.
- Mentored six undergraduate and two graduate research students; developed research procedures, provided technical guidance, and maintained safe, well-instrumented laboratories.

Graduate Research Assistant – University of Calabria (ITM-CNR), Italy

Sep – Dec 2011

- Characterized spinning parameters for hollow-fiber membranes used in protein separation; developed nanoparticle-polymer composite membrane coatings and tested composite membranes for separation processes.

SELECTED PUBLICATIONS (PEER-REVIEWED, SCOPUS-INDEXED)

More than 25 journal articles; listed most-recent first. Underlined name denotes the applicant.

1. Sultan, A.J., Yahya, A.A., Faraj, F.H., Singh, N. S. S., Jasim, D. J., Sabri, L. S., Aljaafari, H. A. S., Taner, M., Hasanabad, A. M. Numerical modeling of the hydrodynamic behavior of MgO–water nanofluid in plate-fin heat exchangers under varying operating conditions. *Scientific Reports*, 2026, 16(1), 21005.
2. Parnian, P., Zoga, P.K., Aljaafari, H.A.S., et al. Dispersion Inhibits Thermal Mitigation of *Pseudomonas aeruginosa* Biofilms on Self-Heating Surfaces. *MicrobiologyOpen*, 2026, 15(2), e70283.
3. Abdulwahhab, N.I., Mohamed, E.A., Aljaafari, H.A.S., et al. Green-synthesized silver nanoparticles from Tulsi leaf extract: synergistic antimicrobial activity against bacterial and fungal pathogens. *Journal of Umm Al-Qura University for Applied Sciences*, 2026.
4. Abdulwahab, H.A., Sultan, A.J., AbdulRahman, A.A., et al. Insights of quantitative imaging and instantaneous heat-transfer-coefficient measurement in a spouted-bed column. *International Journal of Heat and Fluid Flow*, 2026, 117, 110152. (co-author: H.A.S. Aljaafari)
5. Aljaafari, H.A.S., Sultan, A.J., Sabri, L.S., et al. Numerical investigation of the effect of external helical fins reinforced with rectangular fins on improving convective heat transfer in helical coils. *International Journal of Thermofluids*, 2025, 29, 101345.
6. Abdulwahab, H.A., Sultan, A.J., AbdulRahman, A.A., Aljaafari, H. A.S et al. Experimental Investigation of Heat Transfer Behavior in Spouted-Bed Reactors under Different Operating Conditions. *Petroleum Chemistry*, 2025, 65(5), 576–588. (co-author: H.A.S. Aljaafari)
7. Gataa, I.S., Hussein, B.A., Sajadi, S.M., Aljaafari, H. A.S et al. The influence of initial temperature on the interactions of water/silver nanofluid with SARS virus using molecular-dynamics simulation. *Powder Technology*, 2025, 466, 121429. (co-author: H.A.S. Aljaafari)

8. Anaee, R.A., [Aljaafari, H.A.S.](#), Naser, Sh.A., Khadom, A.A., Abd, A.M., Anai, T.A. Expired Actifed Drug as Corrosion Inhibitor for Low-Carbon Steel in Phosphoric Acid: Experimental and Theoretical Investigation. *Iranian Journal of Chemistry and Chemical Engineering*, 2025, 44(4), 1063–1073.
9. Alawi, N.M., Nguyen, H.M., Al-Mohammedawi, H.H., [Aljaafari, H.A.S.](#), et al. Steam combined dry reforming of methane over CoMo/Al₂O₃ nanoflake catalyst at low microwave power irradiation. *Brazilian Journal of Chemical Engineering*, 2025, 42(1), 305–315. DOI:10.1007/s43153-024-00436-0.
10. Mohamed, E.A., Hasoon, B.A., Abdulwahhab, N.I., Sulaiman, G. M., Jawad, K. H., [Aljaafari, H. A. S.](#), et al. Green synthesis of parsley-derived silver nanoparticles and their enhanced antimicrobial and antioxidant effects against foodborne resistant bacteria. *Green Processing and Synthesis*, 2025, 14(1), 20250094. (co-author: H.A.S. Aljaafari)
11. Ruhani, B., Basem, A., [Aljaafari, H.A.S.](#), et al. Mechanical behavior of baghdadite-polycaprolactone-graphene nanocomposite for optimization of the bone-treatment process using molecular-dynamics simulation. *Results in Engineering*, 2024, 24, 102980. DOI:10.1016/j.rineng.2024.102980.
12. Hu, P., Basem, A., Jasim, D., [Aljaafari, H.A.S.](#), et al. The effect of amplitude of heat flux on the adsorption of doxorubicin by an MOF-11 bio-carrier using molecular-dynamics simulation. *International Communications in Heat and Mass Transfer*, 2024, 159, 108043. DOI:10.1016/j.icheatmasstransfer.2024.108043.
13. [Aljaafari, H.A.S.](#), Ali, Sh.B., Abbas, M.A., Anaee, R.A., et al. Improvement in the Corrosion Behavior of Al-Si-xWC Composites Prepared by Casting Technique. *Journal of Bio- and Tribo-Corrosion*, 2024, 10(4), 100. DOI:10.1007/s40735-024-00902-9.
14. Basem, A., Taher, H.H., Majdi, H.Sh., [Aljaafari, H.A.S.](#), Sultan, A.J., Khan, B. CO₂ emission reduction by geothermal-driven CCHP tailored with turbine bleeding and regeneration CHP; economic/multi-aspect comparative analysis with GA-based optimization. *Results in Engineering*, 2024, 23, 102646. DOI:10.1016/j.rineng.2024.102646.
15. Sun, D., Gataa, I.S., [Aljaafari, H.A.S.](#), et al. The molecular-dynamics simulation of a coronavirus-based compound (6OHW structure) interacting with interferon beta-1a protein at different temperatures and pressures. *International Communications in Heat and Mass Transfer*, 2024, 157, 107796. DOI:10.1016/j.icheatmasstransfer.2024.107796.
16. Liu, Z., Basem, A., [Aljaafari, H.A.S.](#), et al. Investigating the effect of heat flux on tetracycline absorption by a bio-MOF-11 nanostructure: a molecular-dynamics approach. *Case Studies in Thermal Engineering*, 2024, 60, 104756. DOI:10.1016/j.csite.2024.104756.
17. [Aljaafari, H.A.S.](#), Abdulwahhab, N.I., Nuxoll, E. Antibiotic Augmentation of Thermal Eradication of Staphylococcus epidermidis Biofilm Infections. *Pathogens*, 2024, 13(4), 327. DOI:10.3390/pathogens13040327.
18. Ben Said, L., Basem, A., Jasim, D.J., [Aljaafari, H.A.S.](#), et al. Numerical investigation of the heat-flux-frequency effect on doxorubicin absorption by a Bio-MOF-11 carrier: a molecular-dynamics approach. *Case Studies in Thermal Engineering*, 2024, 55, 104158. DOI:10.1016/j.csite.2024.104158.
19. Wei, D., Basem, A., Alizadeh, A., Jasim, D.J., [Aljaafari, H.A.S.](#), et al. Optimum tilt and azimuth angles of a heat-pipe solar collector: an experimental approach. *Case Studies in Thermal Engineering*, 2024, 55, 104083. DOI:10.1016/j.csite.2024.104083.
20. [Aljaafari, H.A.S.](#), Parnian, P., Van Dyne, J., Nuxoll, E. Thermal susceptibility and antibiotic synergism of methicillin-resistant Staphylococcus aureus biofilms. *Biofouling*, 2023, 39(5), 516–526. DOI:10.1080/08927014.2023.2234290.
21. Almukhtar, R.S., Yahya, A.A., Mahdy, O.S., et al., [Aljaafari, H.A.S.](#), Alsaedi, S.S. Numerical Analysis of Gas Hold-Up of a Two-Phase Ebullated-Bed Reactor. *ChemEngineering*, 2023, 7(5), 101. DOI:10.3390/chemengineering7050101.
22. [Aljaafari, H.A.S.](#), Gu, Y., Chicchelly, H., Nuxoll, E. Thermal Shock and Ciprofloxacin Act Orthogonally on Pseudomonas aeruginosa Biofilms. *Antibiotics*, 2021, 10(8), 1017. DOI:10.3390/antibiotics10081017.
23. Alalwan, H.A., Mohammed, M.M., Sultan, A.J., Abbas, M.N., Ibrahim, T.A., [Aljaafari, H.A.S.](#), Alminshid, A.A. Adsorption of Methyl Green Stain from Aqueous Solutions using Non-conventional Adsorbent Media: Isothermal, Kinetic and Thermodynamic Studies. *Bioresource Technology Reports*, 2021, 14, 100680. DOI:10.1016/j.biteb.2021.100680.
24. Alalwan, H.A., Alminshid, A.H., [Aljaafari, H.A.S.](#) Promising evolution of biofuel generations – a subject review. *Renewable Energy Focus*, 2019, 28, 127–139. DOI:10.1016/j.ref.2018.12.006.
25. Ricker, E., [Aljaafari, H.A.S.](#), Bader, T., Hundley, B., Nuxoll, E. Thermal Shock Susceptibility and Regrowth of Pseudomonas aeruginosa Biofilms. *International Journal of Hyperthermia*, 2018, 34(2), 168–176. DOI:10.1080/02656736.2017.1347964.

26. Alsalhy, Q.F., Salih, H.A., Simone, S., Zablouk, M., Drioli, E., Figoli, A. Poly(ether sulfone) (PES) hollow-fiber membranes prepared from various spinning parameters. *Desalination*, 2014, 345, 21–35. DOI:10.1016/j.desal.2014.04.029.
27. Alsalhy, Q.F., Salih, H.A., Melkon, R.H., Mahdi, Y.M., Abdul Karim, N.A. Effect of preparation conditions on the morphology and performance of poly(imide) hollow-fiber membranes. *Journal of Applied Polymer Science*, 2014, 131(12), 40428. DOI:10.1002/app.40428.
28. Alsalhy, Q.F., Ibrahim, R.I., Salih, H.A., Zablouk, M.A. Experimental investigation and optimization of air sparging on hollow-fiber membrane performance. *American Journal of Modern Chemical Engineering*, 2014, 1, 40–54.

Conferences: More than 20 papers presented at annual meetings and conferences in the USA, Italy, Malaysia, Egypt, Turkey, and Iraq.

Academic Service & Professional Activities

- Served as a peer reviewer for international scientific journals, with 53 WOS verified review reports across chemical engineering, energy, environmental, and related disciplines.

PROFESSIONAL DEVELOPMENT & TRAINING

- Graduate Certificate in College Teaching – University of Iowa, College of Education (May 2020).
- Process Safety – DOW Chemical Company, Lake Jackson, TX (June 2018).
- Laboratory Design – Sandia National Laboratories, Denver, CO (June 2019).
- Chemical & Biological Security Training – U.S. Department of State, Kansas City, MO (Dec 2017).

HONORS & AWARDS

- Three letters of appreciation from the Iraqi Prime Minister; eight from the Minister of Higher Education & Scientific Research.
- 20+ letters of appreciation from the President of the University of Technology; 30+ from the Head of its Chemical Engineering Department.
- Kammermeyer Research Award, Dept. of Chemical & Biochemical Engineering, University of Iowa (2022).
- Microbes at Biomedical Interfaces Graduate Student Competition Award, AIChE Annual Meeting (2020).
- Ballard & Seashore Dissertation Fellowship and two Summer Fellowships, Graduate College, University of Iowa (2019–2020).
- Winner and Finalist, Three-Minute Thesis (3MT) Competition, University of Iowa (2019); multiple travel grants and a Post-Comprehensive Research Award.
- Graduate study fellowship sponsored by the Ministry of Higher Education & Scientific Research.

SOFTWARE & SIMULATION SKILLS

- Aspen HYSYS (process simulation – distillation, vacuum distillation, and separation-unit design).
- COMSOL Multiphysics (heat-transfer and multiphysics modeling); Python (data analysis and visualization); Minitab (RSM / design of experiments).

INSTRUMENTATION EXPERIENCE

GC, HPLC, GC-MS · UV-Vis & Fluorescence Spectroscopy · FTIR · SEM & TEM · AAS · Laser-Diffraction Particle-Size Analyzer · Rheometer · Contact-Angle & Surface-Tension · PCR / DNA extraction · Capillary Electrophoresis · pH / O₂ / Turbidity / Conductivity meters · Alternating Magnetic-Field Generator · Hollow-Fiber Spinning · Soxhlet Extractor · Fermenter.

LANGUAGES

Arabic (native) · English (professional/fluent – Ph.D. completed in the **United States**).