

Short Resume

Mohammad Alnaief is the Operation, Commissioning, and Plant Manager of the Entrepreneurial Uranium R&D Extraction Plant at Jordanian Uranium Mining Company (JUMCO), Jordan. In addition, he is also an Associate Professor at the German Jordanian University in the Department of Pharmaceutical and Chemical Engineering. Currently, he is leading the R&D activities that focus on uranium hydrometallurgy processes, product purification and valorization, plant operational modes, feasibility studies, and all related optimization and management processes. Besides, he is an expert in applying supercritical fluid technology to produce tailored nanoporous material (aerogel) for advanced engineering and life science applications. Additionally, he researches the use of hybrid aerogels in renewable energy applications, catalyst applications, and water purification systems.

- **Personal Information:**

Name: Mohammad Hussein Ali Alnaief

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- **Research interest:**

- ❖ Uranium Extraction and purification from their ore deposits.
- ❖ IX and liquid extraction system for Uranium concentration.
- ❖ Supercritical fluid technologies and their applications in producing nanostructured materials for life science, environmental and catalytical applications.
- ❖ Supercritical CO₂ Extraction of essential oils.
- ❖ Production of hybrid aerogel-based composites.
- ❖ Renewable energy: concentrated solar energy, biofuel upgrading, biodiesel, and biogas technology.

• **Professional Experience:**

October 2019 - present

Operation and Commissioning Manager of the Entrepreneurial Uranium Extraction Plant at Jordanian Uranium Mining Company, Jordan Atomic Energy Commission

Key Responsibilities:

- Process development and optimization.
- Production of yellowcake from Jordanian ore with high purity.
- Establishment of a research lab to support the process.
- Leading and planning R&D activities
- Pre-feasibility studies and operation scenarios.
- Valorization of by-products.
- Production of extra pure Vanadium as a by-product.
- C1-C5 Commissioning of the Uranium Extraction pilot plant.
- IX operations (resin selection, adsorption thermodynamics, parametric optimization, operation modes).
- SOPs drafting and approvals.
- industrial-scale investigation
- strategic planning, staffing, budgeting & procurement planning

January 2019 – present

Since October 2019, In secondment to the Jordan Atomic Energy Commission

Associate professor of chemical engineering at the Pharmaceutical and Chemical Engineering Department, German Jordanian University. Amman, Jordan.

Key responsibilities:

- Teaching undergraduate and graduate courses in Chemical Engineering. This includes preparing course materials, delivering lectures, grading assignments, and meeting with students during office hours.
- Securing funds, conducting research, publishing results in scientific journals, and supervising graduate projects.
- Serve on departmental and university committees, mentor students, and participate in community outreach activities.

September 2011 – January 2019

Assistant professor of chemical engineering at the Pharmaceutical and Chemical Engineering Department, German Jordanian University. Amman, Jordan.

Key responsibilities:

- Teaching undergraduate courses in Chemical Engineering. This includes preparing course materials, delivering lectures, grading assignments, and meeting with students during office hours.
- Establishing a research line in nanoporous materials and high-pressure technology. This includes securing funds, conducting research, publishing results in scientific journals, and supervising graduate projects.
- Serve on departmental and university committees, mentor students, and participate in community outreach activities.

September 2011 – September 2015 **Head of the Pharmaceutical and Chemical Engineering Department,**
German Jordanian University. Amman, Jordan.

Key Responsibilities

- **Academic leadership:** Providing academic leadership to the department, including developing and implementing strategies to improve the quality of teaching and research and ensuring that the department meets the academic standards set by the institution.
- **Faculty management:** Managing the faculty within the department, including overseeing the recruitment, retention, and evaluation of faculty members and ensuring that faculty workload is distributed equitably.
- **Curriculum development:** The department head is responsible for overseeing the development and maintenance of the chemical engineering curriculum, ensuring that it is up-to-date, relevant, and meets the needs of students.
- **Budget management:** Managing the department's budget, including securing funding for research, and teaching initiatives and ensuring that resources are allocated appropriately.
- **Student support:** Ensuring that students in the department receive the support they need to succeed, including advising students on academic and career matters and addressing any concerns they may have.
- **Research support:** Supporting research activities within the department, including securing funding for research projects, supporting faculty in their research activities, and promoting collaboration among faculty members.
- **External relations:** This involves representing the department to external stakeholders, including industry partners, government agencies, and other academic institutions. It also involves developing partnerships and collaborations, securing funding, and promoting the department's activities and achievements.

July 2016 – August 2016
September 2015 – October 2015

Guest Professor at Hamburg University of Technology “Extraction of valuable product from agricultural side streams for sustainable biogas production.”

June 2013 – September 2013

Guest Professor at Hamburg University of Technology “Production of nanoporous biodegradable materials based on polysaccharides using the supercritical fluid technology for life science applications.”

• **Education:**

May 2008 – August 2011

PhD

Development of production processes of nanoporous materials for Advance Drug Delivery System

Hamburg University of Technology, Institute of Thermal Separation Processes, Eissendorferstr. 38, D-21073, Hamburg Germany

Feb. 2007-April 2008

Postgraduate research

Functionalization and preparation of silica aerogels for advanced drug carriers systems

Friedrich - Alexander - University Erlangen – Nuremberg, Chair of Separation Science and Technology Science, Egerlandstr. 3 D-91058 Erlangen, Germany.

Sep. 2004 – Aug. 2006

Master Study

Master of Science in Chemical and Bio-Engineering
Friedrich-Alexander University, Erlangen-Nürnberg.

Master thesis: **“Particle Substrate Adhesion in Humid Ambience.”**

Sep. 1999 – June 2004

Undergraduate Study

Bachelor of Science in Chemical Engineering.

Jordan University of Science and Technology, Irbid, Jordan.

With an average of 85.2% (excellent), the rank was the first among 72 students.

• **Academic research/funded projects:**

June 2022 - Ongoing

Innovative Aquifers Governance for Resilient Water Management and Sustainable Ecosystems in Stressed Mediterranean Agricultural Areas(AGREEMed)” \$ 111,000

The objectives are:

- Intensive survey on conventional and non-conventional water technology status in the MENA region.
- To increase the water yield of an existing solar-driven brackish water reverse osmosis (RO) plant from 50% to over 80%, with optimized dissolved solids separation.
- To design, optimize, demonstrate, and evaluate the developed prototype.
- To initiate and promote the transfer of technological solutions into practice.

June 2021 – Ongoing

Production of biodiesel, a renewable energy source from waste cooking oil using an innovative catalytical system based on nanoporous material, \$ 92,000.

Development of a new heterogeneous catalyst manufactured from metal oxides for biodiesel production from waste cooking oil utilizing aerogels process.

Manufacturing of aerogel adsorbent material for biodiesel purifications, i.e., removing free fatty acid and glycerol.

April 2019 - May 2023

COST Action CA18125

AERoGELS–Advanced Engineering and Research of (aero)Gels for Environment and Life Sciences:

Funded project from the ***European Union***

Specific objectives of the Action are:

- To develop specific cutting-edge bioactive aerogels considering their market impact.

- To develop specific innovative aerogel features and products for environmental applications, considering their market impact.
- To explore novel or modify existing chemical (sol-gel) and physical (e.g., drying) routes for aerogel processing and to develop and adapt analytical tools for aerogel characterization and performance.
- To evaluate innovative aerogel processing approaches to turn advanced materials development from lab-scale into commercial products from technological, safety, and economical points of view.
- To set the basis of common knowledge on aerogels regarding toxicity, health, risk safety assessment, environmental impact, and regulatory issues.

<https://cost-aerogels.eu/>

May 2019 – April 2023

Ceramic Nanofibers-Reinforced Silica Aerogel as a Potential Reforming Catalyst for Biofuel Upgrading, \$ 93,000

- Enhance the mechanical stability of silica aerogel by modifying the production process parameters.
- Production of ceramic nanofibers material with various properties and functionality using a chemical precursor approach.
- Incorporation of nanofibers ceramic material within the aerogel matrix in a way that positively modifies silica aerogel's mechanical and functional properties.
- Investigating the produced hybrid nanostructured material for its potential as a gas-reforming catalyst.

January 2017 – Sep 2020

Ultra-low-density nanoporous materials for innovative drug delivery routes, \$ 97,000

- Production of microparticles from intelligent nanoporous materials with high porosity and ultralow density for respiratory drug delivery in dry inhalable powder.
- Significant improvement of particles flowability and lung delivery compared to state-of-the-art formulations.
- Analysis of the possibility of using organic aerogels and cryogels as drug delivery systems for the pulmonary administration route.

January 2015 – November 2018

Using supercritical fluid technology to prepare pulmonary drug delivery systems for lung cancer treatment, \$ 90,000.

Funded project from the *Scientific Research Support Fund* in collaboration with Jordan University of Science and Technology

- To design a drug carrier composed of chitosan and alginate with proper size and aerodynamic properties for pulmonary drug delivery using supercritical fluid technology.
- Different selected lung cancer drugs will be loaded on the prepared carrier and fully characterized.

January 2015 – March 2018

Biogas Production in Local Communities in Jordan € 670,000

Funded project from the *European Union*, budget line BGUE-B2014-21.035100

- To develop a hybrid solar-biogas plant design (industrial scale) for agricultural and food waste in local communities.

January 2014- November 2017

TEMPUS project (development of new master study program) € 1,468,222

Excellence in Nanoscience Education for the MENA Region (XNEM)

October 2004 – Aug. 2006

Research Assistant

Institute of Particle Technology, Friedrich-Alexander University Erlangen-Nürnberg, Germany.

- Developing the “toner jumping method” for investigating the adhesion forces between toner particles and different substrates.
- Investigation of adhesion forces between different polymer particles and different substrates, applying an Atomic Force Microscope.
- FEM simulation of particle deformation and its influence on the adhesion forces.

• **Consultation:**

**Interior Ministry
August**

Assigned by the **Interior Minister** to participate in the committee to evaluate the Aqaba industrial zone's safety measures and hazardous management programs. In addition, outlining of the first emergency response room inside the zone.

**Food and Agricultural
Organization Jordan FAO
November 2016**

Study and evaluate building a biogas plant at the Za'atary refugee camp in Jordan. The consultation includes doing biogas potential tests for organic waste and the sludge from the wastewater treatment plant. The outcome was used to design, build, and operate the biogas plant at that camp.

**2022 Prime Ministry office
December 2012**

Assigned by the Prime Minister to Participate in the **Prime Ministry committee** to study and evaluate the application of Jordan University of Science and Technology for establishing a nanotechnology center with a total cost of 21 million JD.

Computer skills:

Professional in Microsoft Office, Microsoft Teams, Project Manager, Minitab, Aspen+

• **Languages:**

Arabic	Mother language
English	Excellent
German	Excellent

- **Awards:**

- ❖ DFG Summer Fellowship, Hamburg University of Technology, July 2016
- ❖ DFG Summer Fellowship, Hamburg University of Technology, September 2015
- ❖ GJU Award of excellence for distinguished researcher 2012/2013, November 2013
- ❖ DFG Summer Fellowship, Hamburg University of Technology, June 2013
- ❖ Return of the expert award “Centre for International Migration and Development” (CIM) 2012
- ❖ Ph.D. scholarship from German-Jordan University 2007 – 2011 (Jordan-Germany)
- ❖ Degussa stiftung scholarship for master thesis Feb 2006 – Aug 2006.
- ❖ Bayern scholarship for master’s study 2005-2006.
- ❖ Dean’s honor list, College of Engineering, Jordan University of Science and Technology, 1999-2004.
- ❖ B.Sc. Scholarship, Ministry of Higher Education and Scientific Research, 1999-2004.
- ❖ Students Deanship Award for performance, 1999-2004.
- ❖ Prime Ministry Award for excellent Academic performance, 2000, 2004.

- **Publications:**

- ❖ **Published articles:**

1. **Alnaief M**, Smirnova I. Effect of surface functionalization of silica aerogel on their adsorptive and release properties. *Journal of Non-Crystalline Solids*. 2010;356(33–34):1644–9
2. **Alnaief M**, Smirnova I. In situ production of spherical aerogel microparticles. *The Journal of Supercritical Fluids*. 2011; 55(3):1118–23.
3. **Alnaief M**, Alzaitoun M, García-González C, Smirnova I. Preparation of biodegradable nanoporous microspherical aerogel based on alginate. *Carbohydrate Polymers*. 2011; 84(3):1011–8.
4. García-González C, **Alnaief M**, Smirnova I. Polysaccharide-based aerogels—Promising biodegradable carriers for drug delivery systems. *Carbohydrate Polymers*. 2011; 86(4):1425–38.
5. Hentzschel C, **Alnaief M**, Smirnova I, Sakmann A, Leopold C. Enhancement of griseofulvin release from liquisolid compacts. *European Journal of Pharmaceutics and Biopharmaceutics*. 2012;80(1):130–5
6. Hentzschel C, **Alnaief M**, Smirnova I, Sakmann A, Leopold C. Tableting properties of silica aerogel and other silicates. *Drug development and industrial pharmacy*. 2012;38(4):462–7
7. García-González C, Uy J, **Alnaief M**, Smirnova I. Preparation of tailor-made starch-based aerogel microspheres by the emulsion-gelation method. *Carbohydrate polymers*. 2012;88(4):1378–86.
8. García-González C, Camino-Rey M, **Alnaief M**, Zetzl C, Smirnova I. Supercritical drying of aerogels using CO₂: Effect of extraction time on the end material textural properties. *The Journal of Supercritical Fluids*. 2012; 66:297–306.
9. **Alnaief M**, Antonyuk S, Hentzschel C, Leopold C, Heinrich S, Smirnova I. A novel process for coating silica aerogel microspheres for controlled drug release applications. *Microporous and Mesoporous Materials*. 2012;160:167–73.
10. Wörmeyer K, **Alnaief M**, Smirnova I. Amino functionalised silica-aerogels for CO₂-adsorption at low partial pressure. *Adsorption*. 2012;18(3–4):163–71.
11. Obaidat RM, Tashtoush BM, Bayan MF, Al Bustami RT, **Alnaief M**. Drying using supercritical fluid technology as a potential method for preparation of chitosan aerogel microparticles. *AAPS PharmSciTech*. 2015;16(6):1235–44.
12. Al-Jammal N, Al-Hamamre Z, **Alnaief M**. Manufacturing of zeolite based catalyst from zeolite tuft for biodiesel production from waste sunflower oil. *Renewable Energy*. 2016;93:449–59.
13. Al-Addous M, **Alnaief M**, Class C, Nsair A, Kuchta K, Alkasrawi M. Technical Possibilities of Biogas Production from Olive and Date Waste in Jordan. *BioResources*. 2017;12(4):9383–95.

14. Jum'ah I, Abdelhay A, Al-Taani H, Telfah A, **Alnaief M**, Rosiwal S. Fabrication and application of boron doped diamond BDD electrode in olive mill wastewater treatment in Jordan. *Journal of Water Reuse and Desalination*. 2017;7(4):502–10.
15. **Alnaief M**, Obaidat R, Mashaqbeh H. Effect of processing parameters on preparation of carrageenan aerogel microparticles. *Carbohydrate polymers*. 2018;180:264–75.
16. Obaidat RM, **Alnaief M**, Mashaqbeh H. Investigation of Carrageenan Aerogel Microparticles as a Potential Drug Carrier. *AAPS PharmSciTech*. 2018;1–11.
17. Mohammad BT, Al-Shannag M, **Alnaief M**, Singh L, Singaas E, Alkasrawi M. Production of Multiple Biofuels from Whole Camelina Material: A Renewable Energy Crop. *BioResources*. 2018;13(3):4870–83.
18. Obaidat R, **Alnaief M**, Jaeger P. Significant solubility of carbon dioxide in Soluplus® facilitates impregnation of ibuprofen using supercritical fluid technology. *Pharmaceutical development and technology*. 2018;23(7):697–705.
19. **Alnaief M**, Mohammad BT, Aljarrah M, Obaidat R. Preparation and preliminary characterization of hybrid alginate – carrageenan aerogel; effect of gelation methods. *Jordanian Journal of Physics*. 2018
20. **Alnaief M**, Obaidat R, Mashaqbeh H. Loading and Evaluation of Meloxicam and Atorvastatin in Carrageenan Microspherical Aerogels Particles. *Journal of Applied Pharmaceutical Science*. 2018
21. Mohammad Al-Addous; Motasem Saidan; Mathhar Bdour; **Mohammad Alnaief**. Evaluation of Biogas Production from the Co-Digestion of Municipal Food Waste and Wastewater Sludge at Refugee Camps Using an Automated Methane Potential Test System. *Energies*. 2018: 12(1): 32-42
22. **Alnaief, M.**, Obaidat, R.M., Alsmadi, M.M., 2020. Preparation of Hybrid Alginate-Chitosan Aerogel as Potential Carriers for Pulmonary Drug Delivery. *Polymers* 12, 2223. <https://doi.org/10.3390/polym12102223>
23. Alsmadi, M.M., Obaidat, R.M., **Alnaief, Mohammad**, Albiss, B.A., Hailat, N., 2020. Development, In Vitro Characterization, and In Vivo Toxicity Evaluation of Chitosan-Alginate Nanoporous Carriers Loaded with Cisplatin for Lung Cancer Treatment. *AAPS PharmSciTech* 12.
24. Altarawneh, I., Batiha, M., Rawadieh, S., **Alnaief, M.**, Tarawneh, M., 2020. Solar desalination under concentrated solar flux and reduced pressure conditions. *Solar Energy* 14.
25. Aydi, A., Ayadi, C., Ghachem, K., Al-Khazaal, A., Delgado, D., **Alnaief, M.**, Kolsi, L., 2020. Solubility, Solution Thermodynamics, and Preferential Solvation of Amygdalin in Ethanol + Water Solvent Mixtures. *Pharmaceuticals* 13, 395. <https://doi.org/10.3390/ph13110395>
26. **Alnaief, M.**; Sandouqa, A.; Altarawneh, I.; Al-Shannag, M.; Alkasrawi, M.; Al-hamamre, Z. Adsorption Characteristics and Potential of Olive Cake Alkali Residues for Biodiesel Purification. *Energies* **2021**, *14*, 16.
27. Obaidat, Rana, Haneen Aleih, Hadeia Mashaqbeh, Bashar Altaani, Mo'tasem M. Alsmadi, and **Mohammad Alnaief**. 2021. "Development and Evaluation of Cocoa Butter Taste Masked Ibuprofen Using Supercritical Carbon Dioxide." *AAPS PharmSciTech* 22 (3): 106.
28. Duong, Thoa, Clara López-Iglesias, Piotr K. Szewczyk, Urszula Stachewicz, Joana Barros, Carmen Alvarez-Lorenzo, **Mohammad Alnaief**, and Carlos A. García-González. **2021**. "A Pathway From Porous Particle Technology Toward Tailoring Aerogels for Pulmonary Drug Administration." *Frontiers in Bioengineering and Biotechnology* 9: 323. <https://doi.org/10.3389/fbioe.2021.671381>
29. Altarawneh, I.; **Alnaief, M.**; Mohammad, B.; Tarawneh, M, **2021** "Comparative Study on the Effect of the Absorber Geometry, Rim Angle and Operational Modes on the Distribution of the Heat Flux over the Absorber's Surface" *Solar Energy*, 225, 905–917.
30. Al-Hamamre, Z., Sandouqa, A., Al-Saida, B., Shawabkeh, R.A., **Alnaief, M.**, **2023**. Biodiesel production from waste cooking oil using heterogeneous KNO₃/Oil shale ash catalyst. *Renewable Energy* 211, 470–483. <https://doi.org/10.1016/j.renene.2023.05.025>
31. Alsmadi, M.M., Jaradat, M.M., Obaidat, R.M., **Alnaief, M.**, Tayyem, R., Idkaidek, N., **2023**. The In Vitro, In Vivo, and PBPK Evaluation of a Novel Lung-Targeted Cardiac-Safe Hydroxychloroquine Inhalation Aerogel. *AAPS PharmSciTech* 24, 172. <https://doi.org/10.1208/s12249-023-02627-3>
32. Al-Addous, M., Bdour, **M.**, **Alnaief, M.**, Rabaiah, S., Schweimanns, N., **2023**. Water Resources in Jordan: A Review of Current Challenges and Future Opportunities. *Water* 15. <https://doi.org/10.3390/w15213729>

❖ **Conferences (presentation)/workshop**

1. Smirnova; **M. Alnaief**; Mehling, T.; Arlt, W.; Günther, U.; Neubert, R. Poröse anorganische und organische Materialien als Träger für Arzneistoffe ProcessNet-Jahrestagung 2008, Karlsruhe, Deutschland (2008).
2. **M. Alnaief**; I. Smirnova, "Production of Biocompatible Aerogel Microparticles" (Vortrag) ProcessNet-Jahrestagung 2009, Mannheim, Deutschland (2009).
3. Hentzschel C.M., Sakmann A., **Alnaief M.**, Smirnova I., Leopold C.S. „Tableting properties of silica aerogel and various silicates" DPhG Jahrestagung 2009, Jena, Deutschland (2009).

4. **M. Alnaief**, I. Smirnova. "Production of Spherical Aerogel Microparticles by Supercritical Extraction of Emulsion" 12th European Meeting on Supercritical Fluids, Graz (2010) (**Keynote Lecture**).
5. **M. Alnaief**, I. Smirnova. "Production and Coating of Silica Aerogel Microspheres for Advance Drug Delivery" CHISA 2010 & ECCE 7, Prague (2010).
6. P. Gurikov, A. Kolnoochenko, A. Didenko, **M. Alnaief**, I. Smirnova, N. Menshutina. "Adsorption of drug from sc. CO₂ and their release from aerogel based formulations: modeling using cellular automata" CHISA 2010 & ECCE 7, Prague (2010).
7. **M. Alnaief**, I. Smirnova, S. Antonyuk, S. Heinrich. "A novel process for production of aerogel microspheres and their coating with polymeric materials in a spouted bed" (Talk) ProcessNet-Jahrestagung, Aachen, 2010.
8. S. Antonyuk, S. Heinrich, **M. Alnaief**, I. Smirnova. "Application of novel spouted bed process for the drying and coating of silica aerogels microspheres for advanced drug delivery" International Drying Symposium (IDS 2010) Magdeburg, Germany (2010).
9. C.A. García-González, **M. Alnaief**, L. Pérez-Cantú; M. Betz, S. Cumana, U. Kulozik, I. Smirnova "Natural polymer-based aerogels: Promising biodegradable nanostructured matrices for life sciences applications" (Talk). 8th European Congress of Chemical Engineering, Berlin, Germany (2011)
10. **M. Alnaief**, C.A. García-González, S. Cumana, K. Wörmeyer, I. Smirnova "Supercritical fluid technology for tailor-made aerogel particles" (Talk) 8th European Congress of Chemical Engineering, Berlin, Germany (2011)
11. C.A. García-González, **M. Alnaief**, I. Smirnova "Polysaccharide-based aerogels: Promising biodegradable matrices for life sciences applications", 13th European Meeting on Supercritical Fluids, The Hague, The Netherlands (2011)
12. **Mohammad Alnaief** "water and wastewater situation in Jordan" DAAD Change by Exchange Project Transformation in Water, Energy and Education Innovation and Transfer Conference (Tunisia 2021)
13. IAEA Interregional Training Course on Project Planning & Management for Decommissioning and Environmental Remediation Projects, May 2021 (**2 weeks course**)
14. Mohammad Al-Shannag, **Mohammad Alnaief**, Hussein Allaboun, Brett Moldovan, Khaled Toukan "Overview of the Development of the Central Jordan Uranium Project", **ALTA 2022** International Annual Metallurgical Conference, Australia (2022)
15. virtual **Technical Meeting to Collect and Document Innovations in the Uranium Production Cycle**, 6 to 9 June 2022 (Workshop)
16. **Mohammad Alnaief**; Mohammad Al-Shannag; Heba Nawafleh; Mohammad Aljarrah. "Evaluation of two commercial resins for the concentration and purification of uranium solutions resulting from the alkaline leaching process of central Jordan uranium deposits", International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle (**URAM-2023**), 8–12 May **2023**, Vienna, Austria.
17. Mohammad Al-Shannag, **Mohammad Alnaief**, Khaled Toukan. "Jordan Uranium Project: Toward Commercial Production" International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle (**URAM-2023**), 8–12 May **2023**, Vienna, Austria.

Date: August 7, 2024

Mohammad Alnaief
