

Dr. MOHAMMAD H. EL-DAKDOUKI

Beirut Arab University
Department of Chemistry, Chairperson
Beirut, Lebanon
Email: m.eldakdouki@bau.edu.lb
Phone: (+961) 70 985 415

EDUCATION

- Professor, Beirut Arab University, Debbieh, Lebanon, 2025-present.
- Associate Professor, Beirut Arab University, Debbieh, Lebanon, 2015-2025.
- Assistant Professor, Beirut Arab University, Debbieh, Lebanon, 2012-2015.
- Research Assistant Professor, Michigan State University, East Lansing, MI, 2011-2012.
- Post-Doctoral fellow, Michigan State University, East Lansing, MI, 2009- 2011.
- PhD, Medicinal and Biological Chemistry, University of Toledo, Toledo, OH, December 2009.
- MS, Organic Chemistry, American University of Beirut, Beirut, Lebanon, June 2004.
- BS, Chemistry, Lebanese University, Beirut, Lebanon, June 2001.

HIGHLIGHTS

- Applied the principles of Green Chemistry to address environmental issues.
- Diverse and interdisciplinary line of research that encompasses pharmaceutical sciences, medicinal chemistry, nanotechnology, biomaterials, targeted therapy, natural products, analytical chemistry, environmental sciences, organic and inorganic synthesis.
- Extensive experience in designing and conducting *in vitro* and *in vivo* biological studies (Cell culture, anticancer, antiinflammatory, antibacterial, antioxidant, anti-Alzheimer's, bioimaging, molecular biology).
- Demonstrated experimental and theoretical knowledge in materials science.
- Hands-on experience in analytical instruments necessary for chemical structure elucidation (NMR, IR, MS, GC/MS, GPC, HPLC, UV-vis spectroscopy, fluorescence, photoluminescence), and nanoparticles characterization (Thermal gravimetric analysis (TGA), dynamic light scattering (DLS), zeta potential measurements, transmission electron microscopy (TEM), scanning electron microscopy (SEM), Energy Dispersive X-Ray Analysis (EDX), X-ray diffraction (XRD), Atomic absorption, Inductively coupled plasma mass spectrometry (ICP-MS), etc.).
- Hands-on experience in molecular imaging techniques such as confocal microscopy, fluorescence microscopy, bioluminescence, magnetic particle imaging (MPI), magnetic resonance imaging (MRI), flow cytometry.
- Profound teaching experience in different fields of chemistry at the undergraduate and graduate levels.
- Established leadership skills and management of teams.
- Proven experience in designing and developing new chemistry programs at the undergraduate and graduate levels.

RESEARCH EXPERIENCE AND INTERESTS

2012-present, Assistant (2012-2015) and Associate (2015-present) Professor of Chemistry, Beirut Arab University, Lebanon

- Design and development of nanoparticles as drug delivery systems.
- Synthesis of novel organic and inorganic compounds.
- Development of contrast agents for clinical imaging modalities.
- Green synthesis of nanomaterials for biomedical and environmental applications.
- Preparation of 'Host-Guest' inclusion complexes for bioactive molecules.
- Phytochemical and biological analysis of bioactive natural products.
- Development of analytical methods for validation of clinical products.
- Deployment of biopolymers and natural products as effective corrosion inhibitors.

Summers of 2013 and 2014, Visiting Scholar, Michigan State University, MI, USA, with Prof. Xuefei Huang

- Synthesized peptide analogues for the prevention of Alzheimer's disease.
- Evaluated the *in vivo* cytotoxic effects of drug-loaded nanoparticles using optical imaging.

2009-2012, Postdoctoral Fellow and Research Assistant Professor, Michigan State University, MI, USA, with Prof. Xuefei Huang

- Designed and synthesized glyco-nanoparticles as potential 'Theranostic' agents for cancer treatment and diagnosis.
- Exploited biopolymers for drug modification and targeting.
- Developed novel nanoparticles for the selective detection of early atherosclerotic plaques.
- Succeeded in the synthesis of magnetic nanoparticles with high cell labeling efficiency.
- Gained experience in maintaining cell culture and molecular biology experiments, as well as in handling animal models (mice and rabbits).
- Utilized techniques such as magnetic resonance imaging (MRI), bioluminescence, light microscopy, confocal imaging, and flow cytometry to evaluate the interactions between multifunctional targeted imaging agents and diseases.

2004-2009, Graduate Research Assistant, Center for Drug Design and Development, University of Toledo, Toledo, OH with Prof. Paul W. Erhardt

- Designed and synthesized novel anthrapyrazole analogues as potential anticancer prodrug candidates for the treatment of hypoxic cancer cells.
- Developed solution-phase procedure to synthesize gram quantities of a novel peptidomimetic analogue.
- Developed a scale-up process for the multigram total synthesis of (+)- and (-)-glyceollin I in quantities for *in vivo* biological investigations.
- Succeeded in process development and preparation of novel perfluorinated adducts as ultrasound contrast agents for breast cancer diagnosis.
- Designed and synthesized novel C-7 and C-10 Taxol® analogues that avoid multidrug resistance for the treatment of prostate and breast cancers.

2002-2004, Graduate Assistant, American University of Beirut, Beirut, Lebanon, with Prof. Makhlouf Haddadin

- Designed and synthesized 2*H*-Indazoles as anticancer agents using the Davis-Beirut reaction.
- Elucidated mechanistic pathway for the regioselective substitution of 2*H*-indazoles.

TEACHING EXPERIENCE

- **Beirut Arab University**:
  Undergraduate program (2012-present): Medicinal Chemistry; Bioorganic Chemistry; Organic Chemistry With Biological Emphasis; Pharmaceutical Organic Chemistry; Spectroscopic Analysis of Chemical Compounds; General Chemistry; Organic Chemistry (for Chemistry majors); Industrial Organic Chemistry; Physical Organic Chemistry.
  Graduate program (2012-present): Chemistry of Nanomaterials and Bioconjugates; Organic Chemistry of Drug Design and Development; Diseases and Natural Products; Research Techniques; Advanced Analytical Chemistry; Advanced Instrumental Analysis; Advanced Organic Chemistry; Advanced Organic Reactions.
- Profound experience with online teaching software and platforms (Moodle, Zoom, Teams, etc.).
- Supervised numerous graduate students (Masters and PhD), 2012-present.
- Served as defense committee member for dissertations at BAU and national universities.
- Teaching assistant, Advanced Organic Chemistry Lab, Department of Medicinal and Biological Chemistry, College of Pharmacy, University of Toledo, USA, 2004-2006.
- Teaching assistant, General and Organic Chemistry Labs, Department of Chemistry, American University of Beirut, Lebanon, 2002-2004.

ADMINISTRATIVE EXPERIENCE

- Head of the Chemistry Department, Faculty of Science, BAU, September 2023-present.
- Member of the Department of Chemistry Programs Development Committee, 2015-present.
- Director of the Specialized Lab for Analysis of Chemical Compounds, BAU, 2017-2024.
- Member of the Faculty of Science council, BAU, 2014-present.
- Member of the Faculty of Science Community Service committee, BAU, 2016-present.
- Head of the Research committee at the Faculty of Science, BAU, 2024-present.
- Member of the Research committee at the Faculty of Science, BAU, 2015-2024.
- Member of the Steering committee for the Continuous Education Center, BAU, 2014-2015.
- Member of BAU Research committee, BAU, 2014-2017 and 2021-present.
- Member of BAU Strategy Action Plan committee, BAU, 2013-2018.

FUNDING

- Funding agency: Beirut Arab University
  Title: Organic dyes degradation, microbial decontamination, and corrosion inhibition efficiency of green synthesized nanoparticles
  PI: Mohammad H. El-Dakdouki
  Co-PI: Prof. Ghassan Younes and Dr. Ibtissam Saad, BAU
  01/12/2025-31/12/2026
  Award amount to PI: $ 10,000

- Funding agency: National Council for Scientific Research (CNRS), Lebanon
  Title: Development of multifunctional magnetic nanoparticles for the selective detection of β-amyloid plaques in Alzheimer's disease
  PI: Mohammad H. El-Dakdouki
  Co-PI: Xuefei Huang, Michigan State University
  01/09/2013 – 31/08/2015
  Award amount to PI: ~ $ 20,000

- Funding agency: Beirut Arab University
  Title: Synthesis, characterization, and antioxidant activity of DCQ and DCQ-loaded nanoparticles
  PI: Mohammad H. El-Dakdouki
  Co-PI: Dr. Karim Raafat, Faculty of Pharmacy, BAU
  01/06/2014-30/05/2016
  Award amount to PI: $ 3,000

- Funding agency: Research Project Arab Research & Innovation Co-Funded Alliances
  Title: Development of Ecological and Bio-sourced Nanotechnologies through the Valorization of Plants and Waste for Water Treatment in the Arab World: Innovations Towards a Sustainable Aquatic Future
  PI (Lebanon Team): **Mohammad H. El-Dakdouki**
  Duration: 2 years

AWARDS

- The Lebanese Industrial Research Achievement (LIRA) Innovation Program, 2025.
- Best Researcher Award, Beirut Arab University, May 2025.
- Erasmus+ Staff Mobility program, Sapienza University of Rome, March 2025 (European Union).
- Fulbright Visiting Scholar program, 2022-2023 (USA Department of State).
- Robert N. Whiteford Memorial Scholarship, University of Toledo, 2008.
- ACS Travel award, 31th National Medicinal Chemistry Symposium 2008, University of Pittsburgh, June 2008.
- Travel award, BioOhio 2008 Annual Conference, Dublin, Ohio, October 2008.
- MAGSS Travel award, 41th Mid Atlantic Graduate Students Symposium in Medicinal Chemistry, Wayne State University, Detroit, July 2008.

PATENTS

- Meouche, W.M.; El-Dakdouki, M.H. Method for Additive Manufacturing of Titanium Oxide-Reinforced Photocurable Resins and Articles Produced Therefrom. Lebanese Patent LE13677, 2026.
- El-Dakdouki, M.H.; Younes, G.O.; El Hajj, R.; Nahhas, H.; Beirut Arab University. Plant-Based Zinc Oxide Nanoparticles for Antimicrobial Dental Applications. Lebanese Patent LE13609, 2026.

AFFILIATION AND COMMUNITY SERVICE

- Member of the Municipality of Barja, Chouf, 2016-present.
- Member of the Iklim Al Kharroub Environmental Emergency Committee, 2024-present.
- Mobarat El Oloum, National Association for Science and Research, Judge.
- Lebanese Association for Advanced Research (LAAS), Judge.

- American Chemical Society, member, 2005-present.
- Beirut Arab University, Scientific Research Committee, 2013-present.
- Beirut Arab University, Continuing Education Steering Committee, 2013-present.
- Volunteer Judge at the Northwest Ohio District Science Day held at the University of Toledo, Spring 2006, Spring 2007, and Spring 2008.
- Volunteer Judge at the Notre Dame Junior Academy Science Fair, Toledo, Ohio, January 2008.

PUBLICATIONS

- El Makdah, M.H., Bitar, Z., Awad, R., Matar, M., El-Dakdouki, M.H. Investigating the Dielectric Properties of Nano-(YIG)x/(Bi,Pb)-2223 Composites. *Physica Scripta*, **2026**, 101, 405912.
- El-Dakdouki, M.H., Yang, C.W., Ullah, A., Fan, F., Liu, K., Hijazi, B.U., Huang, X. Selective Magnetic Particle Imaging of CD44 Expressing Cells Using Iron Oxide Nanoprobes Functionalized with Chemically Modified Hyaluronan. *Nanoscale Advances*, **2026**, 8, 4385–4399, https://doi.org/10.1039/d5na00979k
- Ghazi, A., Said, M.A., Benouis, K., Nourine, M.N., Messaoud, S.A.E.K.A., Belyagoubi, L., Benouis, B.H.K., Mokhtari-Soulimane, N.A., El-Dakdouki, M.H., Younes, G.O., Bouaziz, M. Optimization of surface plasmon resonance in green-synthesized silver nanoparticles using response surface methodology: characterization and antibacterial assessment. *Pure and Applied Chemistry*, **2026**. https://doi.org/10.1515/pac-2025-0724
- Chehade, N.M., Faraj, M., Mhanna, R., Bouaziz, M., Younes, G.O., El-Dakdouki, M.H. Valorization of Kiwi Peel Biowaste into Silver Nanoparticles as Ecofriendly Corrosion Inhibitors for Mild Steel in HCl Medium. *Current Research in Green and Sustainable Chemistry*, **2026**, 12, 100513.
- Hussein, A.S.R, Younes, G.O., El-Dakdouki, M.H. Impact of environmental conditions on allometric and morphometric traits of fish in Jiyeh, Lebanon: A multivariate analysis. *Egyptian Journal of Aquatic Research*, **2025**, 51, 546-554.
- Helmi, L., Sunoqrot, S., Abusulieh, S., Huwaitat, R., Debs, E., Khazaal, S., El-Dakdouki, M.H., Louka, N., Nada El Darra, N. Valorization of Tomato Leaves: Optimization of Eco-Friendly Phenolic Extraction and Assessment of Biological Activities. *Foods*, **2025**, 14, 3383.
- Hamze, Z.K., Assi, S., Mhanna, R., Bouaziz, M., El Amin Said, M., Benouis, K., Fayad, L., Younes, G.O., El-Dakdouki, M.H. Sustainable preparation of multifunctional green silver nanoparticles for efficient catalytic dye degradation and bacterial inhibition *Environmental Science and Pollution Research*, **2025**, 32, 22698–22718.
- Helmi, L., Sunoqrot, S., Hijazi, A., Alayli, M., Rajha, H.N., Al Bakri, M., El-Dakdouki, M.H., Nada El Darra, N. Tomato Leaves as a Sustainable Biosorbent for the Effective Removal of Some Organic Dyes and Lead from Water. *Frontiers in Environmental Science*, **2025**, 13, 1615815.
- Rammal, M., Kara, M., Adnan Badran, A., Haidar, C., Zahreddin, H., Hussein Bassal, H., Bechelany, El-Dakdouki, M.H., Hijazi, A. Phytochemical Profiling, Antioxidant Activity, Food Preservation, and Insecticidal Properties of *Origanum syriacum* and *Cymbopogon winterianus* Extracts. *Foods*, **2025**, 14, 1347.

- Taleb, B., Jahjah, R., Abdel Baki, Z., Hijazi, A., Elchami, F., El-Dakdouki, M.H. Palladium-Catalyzed Transfer Hydrogenation of Saturated Compound Using Formic Acid as the Hydrogen Source. *Chemical Methodologies*, **2025**, 9, 473-488.
- Taleb, B., Jahjah, R., Abdel Baki, Z., Hijazi, A., Nehmeh, B., El-Dakdouki, M.H. Rhodium-Catalyzed Transfer Hydrogenation of Cinnamic Acid Using Formic Acid as the Hydrogen Source. *Chemical Methodologies*, **2025**, 9, 268-276.
- Rammal, M., Kataya, G., Badran, A., Yazbek, L., Haidar, S., Hassan, K.H., Hijazi, A., Meouche, W., Bechelany, M., El-Dakdouki, M.H. Biochar Derived from Citronella and Oregano Waste Residues for Removal of Organic Dyes and Soil Amendment. *Current Research in Green and Sustainable Chemistry*, **2024**, 9, 100443.
- Hijazi., B., Faraj, M., Mhanna, R., El-Dakdouki, M.H. Biosynthesis of silver nanoparticles as a reliable alternative for the catalytic degradation of organic dyes and antibacterial applications. *Current Research in Green and Sustainable Chemistry*, **2024**, 8, Article 100408.
- Kassem Agha, M., Maatouk, B., Mhanna, R., El-Dakdouki, M.H. Biosynthesis of silver nanoparticles using *Actinidia deliciosa* peel extract: Optimization, characterization, and catalytic activity for methylene blue dye degradation. *Journal of Nanomaterials*, **2024**, Article ID 8813109.
- Hamze, Z., Faraj, M., Mhanna, R., Younes, G., El-Dakdouki, M.H. Green synthesis of silver nanoparticles by *Citrus aurantium* peels extract as sustainable inhibitor to attenuate acid corrosion of mild steel. *Journal of Bio- and Tribo-Corrosion*, **2024**, 10, 56.
- Mansour, R., Halwani, J., Mina, S., El-Dakdouki, M.H. Seasonal assessment of surface water and sediments pollution in Rachiine River, Northern Lebanon, using multivariate statistical analysis. *Heliyon*, **2024**, 10, e39016.
- Massoud, R.; Bouaziz, M.; Abdallah, H.; Zeiz, A.; Flamini, G.; El-Dakdouki, M.H. Comparative Study on the Chemical Composition and Biological Activities of the Essential Oils of *Lavandula angustifolia* and *Lavandula x intermedia* cultivated in Lebanon. *ACS Omega*, **2024**, 9, 30244−30255.
- Rammal, M., Khreiss, S., Badran, A., Mezher, M., Bechelany, M., Haidar, C., Khalil, M.I., Baydoun, E., El-Dakdouki, M.H. Antibacterial and Antifungal Activities of *Cimbopogon winterianus* and *Origanum syriacum* Extracts and Essential Oils against Uropathogenic Bacteria and Foodborne Fungal Isolates. *Foods*, **2024**, 13, 1684.
- Mansour, R.; El-Dakdouki, M.H.; Mina, S. Phylogenetic group distribution and antibiotic resistance of *Escherichia coli* isolates in aquatic environments of a highly populated area. AIMS Microbiology, **2024**, 10, 2, 340-362.
- Rammal, M., Badran, A., Haidar, C.; Sabbah, A., Bechelany, M., Awada, M., Haidar Hassan, K., El-Dakdouki, M.H., Raad, M.T. *Cymbopogon winterianus* (Java Citronella plant): A multi-faceted approach for food preservation, insecticidal effects, and bread application. *Foods*, **2024**, 13, 803.
- Kilo, M.; Saad, I.; Younes, G.; El-Dakdouki, M.H. Corrosion inhibition of carbon steel in acidic solutions using *Phaseolus vulgaris* L. extract as a green inhibitor. *Moroccan Journal of Chemistry*, **2024**, 12, 473-492.
- Zeiz, A.; Chayya, Z.; Kassem, Z.; Hijazi, A.; Khawaja, G.; El-Dakdouki, M.H. Synthesis of ruthenium complexes and assessing their anticancer and antibacterial effects. *Farmacia*, **2024**, 71, 1129-1142.
- Zeiz, A.; Kawtharani, R.; Elmasri, M.; Khawaja, G.; Hamade, E.; Ayoub, A.J.; Abrari, M.; El-Dakdouki, M.H. Molecular properties prediction, Anticancer and Anti-inflammatory Activities of Some Pyrimido[1,2-b]pyridazin-2-one derivatives. *Bioimpacts*, **2024**, 14(2): 27688.

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- El Makdah, M.H.; El Ghouch, N.; El-Dakdouki, M.H.; Awad, R.; Matar, M. Structural, electrical and mechanical properties of the $(NdFeO_3)x/(CuTl)$-1223 superconductor phase. *Applied Physics A*, **2023**, 129, Article number: 265.
- El Makdah, M.H.; El Ghouch, N.; El-Dakdouki, M.H.; Awad, R.; Matar, M. Synthesis, characterization, and Vickers microhardness for $(YIG)_x$/(Bi,Pb)-2223 superconducting phase. *Ceramics International*, **2023**, 49, 22400-22422.
- Karneeb, S.; Baydoun, S.; Nasser, H.; Arnold-Apostolides, N.; El-Dakdouki, M.H. Chemical composition, antioxidant, and hemolytic activities of sage (*Salvia fruticosa* Miller) cultivated in Lebanon. *BAU Journal of Science and Technology*, **2023**, 4, Article 3.
- Anas, M.; El Makdah, M.H.; El-Dakdouki, M.H.; Awad, R.; Hassan, M.S. Investigation of physical properties of (nano-SmIG)/(Bi, Pb)-2212 phase. *Journal of Low Temperature Physics*, **2023**, 213, 191–214.
- Fayoumi, L.; El-Dakdouki, M.H. Chapter 16: Pelargonium Species and their Usage in the Middle East as Medicinal Herbs. In: Ancient and Traditional Foods, Plants, Herbs and Spices Used in the Middle East. Vinood Patel (ed.), Francis and Taylor. **2023**.
- Fayoumi, L.; Khalil, M.; Ghareeb, D.; Chokr, A.; Mohamed Bouaziz, El-Dakdouki, M.H. Phytochemical constituents and therapeutic effects of the essential oil of rose geranium (Pelargonium hybrid) cultivated in Lebanon. *South African Journal of Botany*, **2022**, 147, 894-902.
- Fayoumi, L.; Khalil, M.; Ghareeb, D.; El-Dakdouki, M.H. Chemical composition and therapeutic activity of Lebanese rose geranium (Pelargonium hybrid) extracts. *Farmacia*, **2022**, 70, 477-490.
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- Mohammad, G.; El-Dakdouki, M.H.; Abdallah, H.; Nasser, H.M.; Arnold-Apostolides, N. Antioxidative and hepatoprotective effects of *Rubus canescens* DC. growing wild in Lebanon. *Nat. Prod. J.* **2021**, 11, 44-56.
- El Makdah, M.H.; El-Dakdouki, M.H.; Mhanna, R.; Al Boukhari, J.; Awad, R. Effects of neodymium substitution on the structural, optical, and magnetic properties of yttrium iron garnet nanoferrites. *Applied Physics A*, **2021**, 127, 304.
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Tripoli, Lebanon. *Environ. Monit. Assess.*, **2020**, 192, 705. DOI: 10.1007/s10661-020-08672-w.

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- Jisr, N.; Younes, G.; Sukhn, C.; El-Dakdouki, M.H. Length-Length Relationships of Six Fish Species Collected from Fishing Area in the City of Tripoli, North of Lebanon. *BAU Journal: Health and Wellbeing*. **2018**, 1, 150-154.
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