

Otmane KHARBOUCH

Ph.D. in Physical Chemistry

📍 Kenitra, Morocco | 📞 (+212) 612 52 37 55 | ✉️ otmane.kharbouch@uit.ac.ma

ORCID: 0000-0001-6577-6828 | Scopus ID: 57962568100

Laboratory IDI – ENSCK, Ibn Tofail University, Kenitra, Morocco

RESEARCH PROFILE

Ph.D. researcher in Physical Chemistry, affiliated with the Laboratory of Engineering, Sustainability and Innovation (IDI) at the National Higher School of Chemistry (ENSCK), Ibn Tofail University, Kenitra, Morocco (since September 2025). Research focuses on corrosion science, materials engineering, and sustainable chemistry, with combined expertise in electrochemistry, surface treatment, metal/air batteries, hydrogen production, and theoretical calculations (DFT, molecular dynamics simulations). Author and co-author of 44 international publications (h-index: 12, +425 citations), holder of 2 patents, and active contributor to peer review for 16 international journals.

EDUCATION

- 2019-2025** **Ph.D. in Fundamental and Applied Chemistry**
Specialization: Physical Chemistry | Distinction: Very Honourable (Highest Grade)
Thesis: "Experimental and Theoretical Study on the Protection of Mild Steel in Industrial Pickling Baths (1M and 15% HCl) Using Nitrogen Heterocyclic Compounds"
Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco | Defended: 23 July 2025
Supervisor: Prof. H. Nassali
- 2017-2019** **Master's Degree in Applied Chemistry, Environment and Sustainable Development**
Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
- 2016-2017** **Bachelor's Degree in Fundamental Studies: Chemistry**
Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco

SCIENTIFIC OUTPUT

44 Publications	H-index: 12 + 425 Citations	51 Peer Reviews	2 Patents (OMPIC)
---------------------------	---------------------------------------	---------------------------	-----------------------------

SCIENTIFIC PUBLICATIONS ([A] Journal Article, [B] Book Chapter and [P] Patent)

[A] Kharbouch, O., Lachhab, R., Saber, I., El-Alouani, M., El Hajri, F., Ouakki, M., Edder, Y., Hsissou, R., Galai, M., Boukhris, S., Nassali, H. (2025) Combined electrochemical and surface characterization (SEM/AFM) of a benzodiazepine derivative for corrosion protection of mild steel in 15% HCl. *Hybrid Advances*, 100539. *Scopus (Elsevier)*.

[A] Kharbouch, O., Dahmani, K., Saber, I., El-Alouani, M., Errahamany, N., El Hajri, F., Galai, M., Boukhris, S., Touhami, M.E., Nassali, H. (2025) A multianalytical approach to benzodiazepine derivatives for the corrosion protection of mild steel in HCl solutions: Electrochemical analysis, SEM/EDX, XPS, DFT, and MDS calculations. *Asia-Pacific Journal of Chemical Engineering*, 20(1), e3164. *Scopus (Wiley)*.

[A] Kharbouch, O., Dahmani, K., Issam, S., El-Alouani, M., Errahamany, N., Rbaa, M., Galai, M., Ebn Touhami, M., Almeer, R., Almaswari, B.M., Nassali, H. (2025) Synthesis and characterization of quinoxalinone-based heterocycles for corrosion inhibition: electrochemical, spectroscopic, and microscopic studies with theoretical analysis. *Anti-Corrosion Methods and Materials*, 72(3), 343–363. *Scopus (Emerald)*.

[A] Kharbouch, O., Dahmani, K., Errahmany, N., Belkheiri, A., Galai, M., El Hajri, F., Alobaid, A.A., Warad, I., Boukhris, S., Ebn Touhami, M., Nassali, H. (2024) Enhancing corrosion resistance of mild steel in 1M HCl: investigation of new benzoxazepine derivatives through synthesis, electrochemical analysis, surface analysis, XPS, DFT, and molecular dynamics simulation. *ChemistrySelect*, 9(15), e202303045. *Scopus (Wiley)*.

[B] Kharbouch, O., Saber, I., Dahmani, K., Azogagh, M., Rbaa, M., Benhiba, F., Dkhireche, N., Galai, M., Hsissou, R., Nassali, H. (2025) Revolutionizing Industrial Protection: Metal-Organic Frameworks against Corrosion. *Advancing Corrosion Control with MOFs: Beyond Rust*, pp. 57–71. *Scopus (ACS Publications)*.

[B] **Kharbouch, O.**, Dahmani, K., El Hajri, F., Ouakki, M., Galai, M., Nassali, H., Boukhris, S., Touhami, M.E. (2023) Corrosion Inhibition of Mild Steel in Acidic Pickling Baths: Benzoxazepine Derivatives as Acid Corrosion Inhibitors. *Handbook of Research on Corrosion Sciences and Engineering*, pp. 529–551. *Scopus (IGI Global)*.

[P] **Kharbouch O.**, Dahmani K., Saber I., Rbaa M., Fardioui M., Galai M., Ebn Touhami M., Nassali H., Alzeqri N. (2024) Polysaccharide-based isatin grafted onto chitosan as a corrosion inhibitor for mild steel in acidic pickling baths. *Patent No. MA 66492 (A1) – OMPIC, Morocco*.

[P] **Kharbouch O.**, Dahmani K., Rbaa M., Fardioui M., Galai M., Ebn Touhami M., Chaouiki M., Alzeqri N. (2023) Use of isatin grafted onto chitosan as a corrosion inhibitor for mild steel in acidic pickling baths. *Patent No. MA 63561 (B1) – OMPIC, Morocco*.

[A] El-Alouani, M., **Kharbouch, O.**, Dahmani, K., Galai, M., Dkhireche, N., Benzekri, Z., Boukhris, S., Ebn Touhami, M., El-Serehy, H.A., Chaouiki, A., Ko, Y.G. (2025) Corrosion protection mechanism of maltoheptaose on aluminum anodes for enhanced performance in alkaline aluminum-air batteries. *Journal of Energy Storage*, 131, 117538. *Scopus (Elsevier)*.

[A] El-Alouani, M., **Kharbouch, O.**, Dahmani, K., Errahmany, N., Saber, I., Galai, M., Benzekri, Z., Boukhris, S., Ebn Touhami, M., Al-Sadoon, M.K. (2025) Enhancing Al–Air Battery Performance with Beta-d-Glucose and Adonite Additives: A Combined Electrochemical and Theoretical Study. *Langmuir. Scopus (ACS Publications)*.

[A] El-Alouani, M., **Kharbouch, O.**, Dahmani, K., Galai, M., Dkhireche, N., Benzekri, Z., Boukhris, S., Touhami, M.E., Almeer, R., Chafiq, M. (2025) Probing corrosion protective mechanism of 2-(4-nitrobenzylidene) malononitrile on anode for enhanced alkaline (4M NaOH) aluminum-air battery performance. *Journal of Alloys and Compounds*, 1010, 178239. *Scopus (Elsevier)*.

[A] Lachhab, R., **Kharbouch, O.**, Ech-chihbi, E., Aribou, Z., Rbaa, M., Ouakki, M., Ebn Touhami, M. (2026) Inhibitory Performance of Imidazole Compounds Against Mild Steel Corrosion in Acidic Media: Electrochemical Techniques, Surface Characterization, and Theoretical Analysis. *Journal of Molecular Structure*, 145259. *Scopus (Elsevier)*.

[A] Dahmani, K., Aribou, Z., **Kharbouch, O.**, Saber, I., Errahmany, N., Galai, M., Rbaa, M., El-Serehy, H.A., Chaouiki, A., Ebn Touhami, M. (2026) Electrochemical and theoretical insight into the corrosion inhibition of brass by water-soluble organic compounds in 3% NaCl solution. *Journal of the Taiwan Institute of Chemical Engineers*, 178, 106505. *Scopus (Elsevier)*.

[B] Hsissou, R., **Kharbouch, O.**, Saber, I., Azogagh, M., Rbaa, M., Galai, M. (2025) Epoxy Resins as Corrosion Inhibitors: Past and Present Advancements and Future Prospects. *Polymers as Corrosion Inhibitors, Polymer Chemistry Series No. 43*, pp. 276–294. *Scopus (Royal Society of Chemistry)*.

[B] Dahmani, K., Kharbouch, O., Galai, M., Rbaa, M., Alzeqri, N., Touhami, M.E., Cherkaoui, M. (2024) Carbon Dots in Energy Storage: Enhancing Bio-electricity Generation, Rechargeable Batteries, and Supercapacitors. *Carbon Dots: Recent Developments and Future Perspectives*, pp. 149–165. *Scopus (ACS Publications)*.

[B] Dahmani, K., **Kharbouch, O.**, Galai, M., Cherkaoui, M., Touhami, M.E. et al. (2024) Composites and Nanocomposites of Polymers as Corrosion Inhibitors. *Phytochemistry in Corrosion Science*, pp. 108–135. *Scopus (CRC Press)*.

Full publication list: *Scopus ID 57962568100 | ORCID 0000-0001-6577-6828*

PEER-REVIEW ACTIVITY (51 REVIEWS)

Journal	Publisher	Reviews	Journal	Publisher	Reviews
Journal of Energy Storage	Elsevier	12	Scientific Reports	Springer Nature	2
International Journal of Electrochemical Science	Elsevier	8	Colloids and Surfaces A	Elsevier	1
Electrochimica Acta	Elsevier	6	Applied Surface Science Advances	Elsevier	1
Journal of Molecular Structure	Elsevier	6	Next Materials	Elsevier	1
Materials Today Communications	Elsevier	3	Journal of Molecular Graphics and Modelling	Elsevier	1
International Journal of Hydrogen Energy	Elsevier	3	Cogent Engineering	Taylor & Francis	1
Journal of Alloys and Compounds	Elsevier	2	Petroleum Science and Technology	Taylor & Francis	1
Journal of Molecular Liquids	Elsevier	2	Journal of Adhesion Science and Technology	Taylor & Francis	1

CONFERENCE PRESENTATIONS

- ▶ **O. Kharbouch**, I. Saber, R. Lachhab, M. El Alouani, F. El Hajri, M. Ouakki, M. Galai, S. Boukhris, H. Nassali (2024) *"Evaluation of the corrosion inhibitory properties of mild steel in acidic solution using electrochemical techniques and surface analyses of new benzodiazepine derivatives"*. 3rd International Congress on Corrosion Inhibitors and Environment (C2ICE-2024), Ibn Tofail University, Kenitra, Morocco. **[Oral]**
- ▶ **O. Kharbouch**, Z. Benzekri, K. Dahmani, M. Ouakki, M. Galai, S. Boukhris, M. Ebn Touhami, H. Elkafsaoui (2022) *"Electrochemical evaluation of novel benzoxazepine derivatives as corrosion inhibitors for mild steel in 1M HCl"*. 5th International Conference on Materials and Environmental Science (ICMES 2022), Mohammed First University, Saïdia, Morocco. **[Oral]**
- ▶ **O. Kharbouch**, K. Dahmani, I. Saber, M. Aoulad Belayachi, Z. Benzekri, N. Dkhireche, M. Galai, S. Boukhris, M. Ebn Touhami (2025) *"Inhibiting Self-Corrosion and Boosting Performance in Alkaline Al–Air Battery Using 2-(4-Nitrobenzylidene) Malononitrile as a Corrosion Inhibitor"*. 2nd International Symposium on Materials, Environmental Sciences and Hygiene (ISMESH 2), USMBA, Fez, Morocco. **[Poster]**
- ▶ **O. Kharbouch**, Z. Benzekri, K. Dahmani, M. Ouakki, M. Galai, S. Boukhris, H. Nassali (2022) *"New benzoxazepinone compounds evaluated electrochemically as corrosion inhibitors for mild steel in 1M HCl"*. 2nd International Days on Corrosion Inhibitors and Environment (J2ICE-2022), Faculty of Sciences, Kenitra, Morocco. **[Poster]**
- ▶ M. El-Alouani, **O. Kharbouch**, K. Dahmani, I. Saber, Z. Benzekri, N. Dkhireche, M. Galai, S. Boukhris, M. Ebn Touhami (2025) *"Improving Alkaline Al–Air Battery Performance and Inhibiting Self-Corrosion with a New Hybrid Sugar-Based Additive"*. 8th International Conference on Materials and Environmental Science (ICMES 2025), Mohammed First University, Saïdia, Morocco. **[Oral]**
- ▶ M. Aoulad Belayachi, **O. Kharbouch**, K. Dahmani, A. El Magri, N. Er-rahmany, I. Saber, F. El Hajri, M. Galai, S. Abdellah, Z. Benzekri, S. Boukhris, R. Almeer, A. Chaouiki (2025) *"Electrochemical, surface, and theoretical studies on amine-based organic compounds as efficient corrosion inhibitors for mild steel in 1M HCl"*. 8th ICMES 2025, Radisson Blu Resort, Mohammed First University, Saïdia, Morocco. **[Oral]**
- ▶ M. El-Alouani, **O. Kharbouch**, K. Dahmani, I. Saber, Z. Benzekri, N. Dkhireche, M. Galai, S. Boukhris, M. Ebn Touhami (2025) *"Investigating Anode Surface Modification Strategies for Improved Corrosion Resistance and Performance in Alkaline (4M NaOH) Aluminum–Air Batteries"*. 1st International Colloquium on Molecular Modelling and Applications (CI2MA), Hassan II University, Casablanca, Morocco. **[Oral]**
- ▶ M. El-Alouani, **O. Kharbouch**, K. Dahmani, I. Saber, Z. Benzekri, N. Dkhireche, M. Galai, S. Boukhris, M. Ebn Touhami (2025) *"Enhancing alkaline Al–Air battery performance and reducing self-corrosion using a novel sugar-based hybrid additive"*. 1st International Symposium on Sustainable Chemistry and Advanced Research on Health and Environment (ISSC-ARHE), USMBA, Fez, Morocco. **[Poster]**
- ▶ I. Saber, **O. Kharbouch**, R. Lachhab, M. El Alouani, K. Dahmani, M. Ouakki, R. Hsissou, M. Galai, M.S. El Youbi (2024) *"Multianalytical approach to bismuth borate glasses for protecting mild steel in corrosive solutions containing 15% HCl"*. 3rd C2ICE-2024, Ibn Tofail University, Kenitra, Morocco. **[Oral]**
- ▶ I. Saber, **O. Kharbouch**, F. El Hajri, K. Dahmani, B. Baach, H. Barbita, S. Farraa, S. Sibous, Z. Benzekri, R. Hsissou, M. Galai, M. Belfaquir, S. Boukhris, M.S. El Youbi (2024) *"Investigation of the properties of a new vitreous material and its application as a heterogeneous catalyst in the synthesis of indeno[1,2-b] quinoxalinones"*. 7th International Conference on Materials and Environmental Science (ICMES 2024), Mohammed First University, Saïdia, Morocco. **[Oral]**

TEACHING EXPERIENCE

Tutorial Teaching (TD)

- 2025/2026** Energy Materials (15h), engineering Cycle S5, CMP, ENSC, Ibn Tofail University
Transient Electrochemical Methods (8h), engineering Cycle S3, CIF, ENSC, Ibn Tofail University

Laboratory Teaching (TP)

- 2025/2026** Transient Electrochemical Methods & Materials Corrosion (24h), engineering Cycle S3, CIF, ENSC
Kinetics and Electrochemical Methods (36h), engineering Cycle S1, ENSC
- 2024/2025** Kinetics and Electrochemical Methods (32h), engineering Cycle S1, CIF/CMP/TEE, ENSC
Transient Electrochemical Methods & Materials Corrosion (16h), engineering Cycle S4, CMP, ENSC
- 2023/2024** Transient Electrochemical Methods & Materials Corrosion (32h), engineering Cycle S4, CMP, ENSC
- 2021–2023** Electrochemical Kinetics and Corrosion (40h), Bachelor Cycle S5, SMC, Faculty of Sciences
- 2021/2022** Experimental Chemistry (20h), Bachelor Cycle S3, SMC, Faculty of Sciences
- 2020/2021** Chemical Transformation in Aqueous Solution / Thermochemistry (20h), Integrated Preparatory Cycle S2, ENSC

Research Internship: Chemical analysis and materials characterization at the Center for Analysis, Expertise, Technology Transfer and Incubation (CUAETTI), Ibn Tofail University, Kenitra (Feb.-Apr. 2022, 120h)

Secondary School Teacher: Chemistry, Gauss Institution, Kenitra, Morocco (September 2023 - Present)

TECHNICAL & RESEARCH SKILLS

Electrochemistry	OCP, CV, chronoamperometry, potentiometry, EIS, Tafel polarization, LSV, GCD, GITT, battery cycling & self-discharge monitoring
Instruments	Bio-Logic (EC-Lab), Gamry (Gamry Software), PGZ100 (VoltaMaster), PARSTAT (VersaStudio)
Surface Analysis	SEM/EDX, AFM, optical microscopy, XRD, UV-Vis, FTIR, ICP-OES, XPS
Theoretical	DFT calculations (Gaussian, Materials Studio), Molecular Dynamics Simulations (MDS)
Energy Materials	Al-air battery performance, hydrogen production, surface treatment, protective coatings
Software	Mathematica, Origin, ZView, EC-Lab, VoltaMaster, HighScore, ChemDraw, Edraw, Zotero, Mendeley, Design-Expert

LANGUAGE SKILLS

Arabic	French	English
Native language	Proficient	Proficient

REFERENCES

- Pr. Younes CHHITI** ✉ younes.chhiti@uit.ac.ma | younes.chhiti@um6p.ma ☎ +212 676 33 14 14
Deputy Director for Research & Cooperation | Director, Laboratory (IDI) ENSCK, Ibn Tofail University, Kenitra, Morocco
- Pr. Hakima NASSALI** ✉ hnassali@yahoo.fr ☎ +212 6 67 66 48 67
Laboratory of Advanced Materials and Process Engineering (LMAGP) Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
- Pr. Moussa OUAKKI** ✉ moussa.ouakkil@uit.ac.ma ☎ +212 611 749 011
Professor of Chemistry, École Nationale Supérieure de Chimie (ENSC), Ibn Tofail University, Kenitra, Morocco
- Pr. Rachid HSISSOU** ✉ hsissou.r@ucd.ac.ma ☎ +212 622 67 85 10
Laboratory of Organic Chemistry, Bioorganic and Environment, Faculty of Sciences, Chouaib Doukkali University