

## Khalid DRAOUI, PhD

-Director of Laboratory of Materials Engineering and Sustainable Energy

Abdelmalek Essaadi University (UAE)-Tétouan



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-Editorial Board Member Applied Clay Sciences FI : 5.6 (Elsevier) ✉ : [kdraoui@uae.ac.ma](mailto:kdraoui@uae.ac.ma)

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h-index = **22**

1233 Citations

Scopus December 2023

h-index = **24**

1605 Citations

Google Scholar citation database December 2023

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### 1- Personal Informations

#### **DRAOUI Khalid**

Date of birth 15/06/1964 Chaouen-Morocco

Full Professor at Faculty of Sciences (Grade C) - Abdelmalek Essaadi University -Tetouan Since 2000.

1991-2000 Associate Professor at FST Gueliz , Department of Chemistry, University Cadi Ayad -Marrakech

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### 2- Skill Highlights

Clays and Clay Minerals, Biopolymers, Nanomaterials, Nanocomposites, Phosphoric Acid, Phosphogypsum, Soils, Pesticides, Building Materials, Water Treatments, Energy storage, Electroanalytical chemistry, Corrosion-Inhibition, Calorimetry, Thermodynamics, Physicochemical characterization...

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### 3- Education

1986 Bachelor's degree in Chemistry, Faculty of Science - Top of the class

1987 DEA in Spectrometry and Structural Physico-chemistry, Aix-Marseille I,

1991 : Ph. D Es Sciences de University Aix-Marseille I : Electrochemistry

1998 : State Doctorate Es-sciences : Thermodynamic and Environmental Chemistry. University Qadi-Ayyad- Marrakech –CTM of CNRS Marseille:

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### 4- UNIVERSITY RESPONSABILITY

- Director of Laboratory Materials Engineering and Sustainable Energy since 2022
- Director of Laboratory Materials and Interfacial Systems 2007-2022
- Member of the university Board 2014-2017 and 2018-2021
- Member of the university committee on scientific affairs 2014-2017 and 2018-2021
- Member of the university Committee on Academic Affairs 2014-2017 and 2018-2021
- Member of University committee on Management affairs 2019
- Member of the Faculty Board 2008-2011
- Member of the Faculty Committee on Academic Affairs 2008-2011

- Vice-Head of chemistry Department FS-Tetouan 2004-2007 and 2008-2011
  - Coordinator Master courses of Specialized Master Degree “**Industrial Chemistry**” 2010-2022
  - Coordinator of Professional Bachelor courses “**Clay and ceramics industry**” 2007-2009
  - Coordinator of Professional bachelor cursus “**Industrial Chemistry**” 2009-2012.
  - UAE Coordinator of Project Erasmus+ INSITES : Institutionalization des Structures d'Innovation de Transfert et d'Exploitation du Savoir depuis 2017-2021
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## 5- RESEARCH ACTIVITY

- UM6P Expert-Evaluator since 2019
- Local Coordinator UAE of network Phoresnet OCP
- Expert Evaluator of CNRST-Morocco 2015-2018: Materials, Water and Energy
- Evaluation of private institution of higher education,
- Evaluation of Bachelor and Master Degree
- Evaluation of continuous training
- Reviewer of Scientific Journals (around 200 papers) :

*Applied Clay Science*

*Journal of Environmental Management*

*Adsorption*

*Clay Minerals*

*Surfaces and Interfaces*

*Journal of Colloid Science and Biotechnology*

*Environmental Engineering and Management Journal*

*Sustainable Chemistry and Pharmacy*

*Recent Patents on Nanotechnology*

*Journal of Materials and Environmental Science*

*journal Mediterranean Journal of Chemistry*

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- Reviewer of National and International Project
- Research Price - University Abdelmalek Essaadi 2012.
- Member of Scientific Committee of International meeting
- Coordinator of meeting « Argiles et Développement Durables ADD »
- Speaker in international meeting (conferences and keynotes)
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## 7- PROJECTS : 20

- Coordinator of project PHC TOUBKAL CNRST-CNR France, Nanocomposites Argiles/Polymers pour le traitement des effluents industriels 2021-2023
  - Coordinator of Thematic Project UAE « Nanocomposites à base d'argiles marocaines et polymères pour le traitement des eaux » 2021-2023
  - Coordinator of project R&D/ phosphates « Nouveaux Nanocomposites à Base d'Argiles et de Polymères Destinés à la Purification de l'Acide Phosphorique et du Phosphogypse et à la récupération des terres rares. 2016-2018 (2,5 MDH)
  - Coordinator of project PPR-CNRST « Nouveaux Nanocomposites à Base d'Argiles Marocaines et Biopolymères pour l'Aménagement des Décharges Publiques » 2015-2018.(1 MDH)
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- Local Coordinator of Project PPR-CNRST « Elaboration de nanocomposites biodégradables à base de biopolymères agro-ressourcés (polylactide et εcaprolactone)-argile : Valorisation de l'argile Marocaine » 2015-2018 (4MDH)
  - Local Coordinator of project (Académie des Sciences Hassan II-CSIC (Spain) 2010 “Hybrid nanobiopolymers based on Polylactide and polyεcaprolactone/Moroccan Rhassoul” (2MDH),
  - Member of AI Project Franco-Marocaine N° MA/08/185 (Programme Volubilis) « Comparaison des performances épuratoires des eaux résiduaires par adsorption et photocatalyse sur des argiles pontées par des oxydes simples ou mixtes de Ti » Egides 17248 WG Universités : MarrakechTetouan-Toulouse-Mulhouse
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) A/023051/09
  - Responsable de projet Action Intégrée PCI Spain- Morocco (AECI) A/023943/09
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) (AECI) A/016700/08
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) A/8191/07
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) A/010590/07
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) A/4879/06
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) A/3327/05
  - Coordinator of Project Action Intégrée PCI Spain- Morocco (AECI) N°60/04/P/E (2004)
  - Member of project Action Intégrée Franco-Marocaine n° MA/06/147 (Programme Volubilis « Synthèse de matériaux d'électrodes par électrolyse en milieu igné » Université Pierre et Marie Curie.
  - Member of project Action Concertée CNRS (France)-CNRST (Maroc), Projet Chimie 10/06 « Electrosynthèse de matériaux carbonés et métalliques (oxydes alliages,...) en milieu igné pour accumulateurs au lithium » Université Pierre et Marie Curie
  - Member of project Water and Environnement PECCA
  - Member of project Protars II« Conception et réalisation de nouvelles et simples électrodes modifiées pour le contrôle continu de la qualité de l'eau » Responsable K.R. TEMSAMANI
  - Member of project action concertée CNR-CNRS S2228 (Centre de Thermodynamique et de Microcalorimétrie de Marseille. (1995)« Etude thermodynamique de l'adsorption des pesticides par les composantes du sol de la région de Marrakech
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## 8- Ph.D SUPERVISED THESIS

24 supervised defended Thesis  
 10 Ph. D thesis in progress  
 More than 150 supervised Master's project

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## 9- PUBLICATIONS :

### **86 Indexed Papers (Scopus, WOS...)**

#### **Recent Publications 2020-2023 : 33 papers**

- 1-** Youssef Zarki, Mohammad Elmourabit, Nordin Ben Seddik, Soukaina Akachar , Salaheddine Rami , Faiza Chaouket, **Khalid Draoui**, Ihssane Raissouni, Dounia Bouchta , Ahmed Ait Aghzzaf ,Corrosion protection of Daphne Gnidium leaf extract encapsulated with beidellite clay: An effective pigment for a long-lasting and eco-friendly coating formulation, Journal of Molecular Liquids 394 (2024) 123710
- 2-** M. Elmourabit, I. Allaoui, F. Chaouket, **K. Draoui**, A. Ait Aghzzaf, I. Raissouni & D. Bouchta, Valorization of Phosphate Sludge: Synthesis of Anti-corrosion Pigments, Physicochemical Study

and Application to the Protection of Mild Steel in a 3% NaCl Medium, *Waste Biomass Valor* 14, 4045–4060 (2023)

**3-** Fatima Hilali, Younes El Kharim, Hasnaa Hilali, Ali Bounab, Hicham El Idrissi, **Khalid Draoui**, Mustapha El Hadri & Mohamed Ahniche, Raw Materials Used in Traditional Pottery from Northern Morocco: Possible Alternative Material for a Sustainable Future in the Fran Ali Area, *Clays Clay Miner.* 71, 616–636 (2023)

**4-** Youssef Zarki, Mohammad Elmourabit, Nordin Ben Seddik, Soukaina Akachar, Ahmed A. Aghzzaf, Faiza Chaouket, **Khalid Draoui**, Ihssane Raissouni, Dounia Bouchta, Electrochemical evaluation of Daphne gnidium extract's antioxidant capacity and its potential for mild steel corrosion protection in NaCl medium, *Materials and Corrosion*, 2023, <https://doi.org/10.1002/maco.202313904>

**5-** Imane Kouda , Nordin Ben Seddik , Asmae Laaziz , Mohamed Hadri , **Khalid Draoui** , Azzeddine Elmidaoui, Efficient removal of cationic dye from wastewater using novel low-cost adsorbent, cellulose-clay composite: Insights from isotherm, kinetic, thermodynamic, and molecular dynamics simulation studies *Journal of Molecular Structure*, 1291, 5, 2023, 135865

**6-** Nordin Ben Seddik, Anas Chraka, Youssef Zarki, Hamza Oulad Idriss, Salaheddine Rami, Fatima Janoub, Ihssane Raissouni, **Khalid Draoui**, Ahmed Ait Aghzzaf, Dounia Bouchta, Reinforcement of an alkyd resin coating incorporating a swelling clay encapsulated with L-cysteine molecules: characterization and corrosion inhibition of Cu-36Zn alloy, 960, 2023, 171052

**7-** M Elmourabit, I Allaoui, F Chaouket, **K Draoui**, A Ait Aghzzaf, I Raissouni, D Bouchta, Valorization of Phosphate Sludge: Synthesis of Anti-corrosion Pigments, *Physicochemical Study and Application to the Protection of Mild Steel in a 3% NaCl Medium* , *Waste and Biomass Valorization*, 1-16, 14, pages4045–4060 (2023)

**8-** Mohamed Choukairi, Dounia Bouchta, Loubna Bounab, Elisa González-Romero, Mohamed Achache, **Khalid Draoui**, Faiza Chaouket, Ihssane Raissouni, Mouad Gharous, A Carbon Paste Electrode Modified by Bentonite and l-Cysteine for Simultaneous Determination of Ascorbic and Uric Acids: Application in Biological Fluids, *ChemistryOpen* 2023 <https://doi.org/10.1002/open.202200201>

**9-** L Azaryouh, H Abara, Z Kassab, E Ablouh, A Aboulkas, M El Achaby, **Khalid Draoui**; Hybrid carbonaceous adsorbents based on clay and cellulose for cadmium recovery from aqueous solution, *RSC advances* 13 (10), ( 2023)6954-6965

**10-** Badia Douhri, **Khalid Draoui**, Ihssane Raissouni, Mohamed Hadri, Abdellah Farah, Nadia Skali Senhaji, Jamal Abrini, Hikmat Douhri , Chemical composition and biological activity of essential oil of the Moroccan endemic *Origanum grosii*, *Materials Today: Proceedings*, Volume 72, Part 7, 2023, 3570-3576

**11-** Mohammadi Ahrouch, José Manuel Gatica, **Khalid Draoui**, Dolores Bellido-Milla, Hilario Vidala, Clay honeycomb monoliths for the simultaneous retention of lead and cadmium in water *Environmental Technology & Innovation* 2022, 27, 102765, FI 7.8

**12-** Hadri, M., El Mrabet, I., Chaouki, Z. **Khalid Draoui**, Mustapha Hamdaoui, Hikmat Douhri & Hicham Zaitan. Valorization of natural diatomite mineral: Application to removal of anionic dye from aqueous solution in a batch and fixed-bed reactor. *J. Cent. South Univ.* 29, 2084–2098 (2022). <https://doi.org/10.1007/s11771-022-5065-y>

**13-** Ilias Barrak , Ikrame Ayouch , Zineb Kassab , Mounir El Achaby , Abdeslam Barhoun , **Khalid Draoui**, Sodium alginate encapsulated Moroccan clay as eco-friendly and efficient

adsorbent for copper ions from aqueous medium *Materials Today: Proceedings* 51 (2022) 2040–2046,

**14-** Mohamed Hadri, , **Khalid Draoui**, Loubna Bounab, Mustapha Hamdaoui, Hikmat Douhri, Iman Kouda, Hicham Zaitan, Thermodynamic and kinetic studies for the adsorption of malachite green on diatomite, *Journal of Environmental Engineering and Science*, 18 (2022) 70-80

**15-** Bentahar, Y., Hurel, C., **Draoui, K.**, Khairoun, S., Marmier, N. Removal of methyl violet by Moroccan clays: kinetics study and equilibrium mechanism, *Chemical Engineering Communications*, 2022, 209(11), 1512–1530, FI 2,49

**16-** Ayouch, I., Barrak, I., Kassem, I. Kassab, Z, **Draoui, K.**, El Achaby, M Ultrasonic-mediated production of carboxylated cellulose nanospheres, *Journal of Environmental Chemical Engineering*, 2021, 9(5), 106302, FI 7.96

**17-** Nabgui, A., El Assimi, T., El Meziane, A., Luinstra G.A., Raihane M., Gouhier G., Thebault P, **Draoui, K.**, Lahcini, M Synthesis and antibacterial behavior of bio-composite materials-based on poly( $\epsilon$ -caprolactone)/bentonite, *European Polymer Journal*, 2021, 156, 110602; FI 5.55

**18-** Ayouch, I., Kassem, I., Kassab, Z., Barrak, I., Barhoun, A., Jacquemin, J.b, **Draoui, K.**, Achaby, M.E. Crosslinked carboxymethyl cellulose-hydroxyethyl cellulose hydrogel films for adsorption of cadmium and methylene blue from aqueous solutions, *Surfaces and Interfaces*, 24, 2021, 101124 / FI 6.14

**19-** Nisrine Hammi<sup>a</sup>, Nathalie Marcotte<sup>d</sup>, Maya Marinova<sup>a</sup>, **Khalid Draoui**<sup>c</sup>, Sebastien Royer<sup>e</sup>, Abdelkrim El Kadib, Nanostructured metal oxide@carbon dots through sequential chitosan templating and carbonisation route, *Carbohydrate Polymer Technologies and Applications* 2, 25 2021, 100043

**20-** Mohamed Chaker Necibia, Ibrahim Amar, **Khalid Draoui**, Borhane Mahjoubd Current situation and future prospects for the production and utilization of sorbing materials for water Sorbents Materials for Controlling Environmental Pollution Current State and Trends depollution in North Africa Avelino Núñez-Delgado, 2021, 49–71 Elsevier ISBN 978-0-12-820042- 1 <https://doi.org/10.1016/C2019-0-01212-5>

**21-** A. Mansouri, A. Ait Aghzzaf, **K. Draoui** Definitive screening design (DSD) optimization of methyl orange adsorption onto Moroccan clay Desalination and Water Treatment, 226 (2021) 372–381 doi:10.5004/dwt.2021.27244 / FI 1.23

**22-** LAAZIZ, Asmae, Imane KOUDA, Abdeslam BARHOUN, and **Khalid DRAOUI**. “Kinetic, Isotherm and Thermodynamic Study of Methyl Orange Adsorption on Raw Clay from North of Morocco”. *Journal of Environmental Treatment Techniques* 9 (3), 675-85. 2021.

**23-** Nordin Ben Seddik, Ihssane Raissounia, **Khalid Draoui**, Ahmed AitAghzzaf, Anas Chraka, Saloua Tazia, Badr Aznag, Faiza Chaouket, Dounia Bouchta Highlighting performances of lanthanum-intercalated stevensite and the commercially available triphosphate aluminium (TPA) as anticorrosive pigments for brass in 3 % NaCl solution: Electrochemical and morphological study, *Progress in Organic Coatings* 147, 2020, 105837/ FI 5.161

**24-** Ikrame Ayouch, Ilias Barrak, Zineb Kassab, Mounir El Achaby, Abdeslam Barhoun, **Khalid Draoui**, Impact of the drying process on the efficiency of alginate beads for cadmium removal from water: Kinetic, isotherm and thermodynamic study. *Environmental Technology & Innovation* Volume 20, 2020, 101157/ FI 7.8

**25-** Ikrame Ayouch, Ilias Barrak, Zineb Kassab, Mounir El Achaby, Abdeslam Barhoun, **Khalid Draoui**, Improved recovery of cadmium from aqueous medium by alginate composite beads filled by bentonite and phosphate washing sludge, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 604, 5 November 2020, 125305/ FI 5.18

**26-** Boumhidi, B., Katir, N., El Haskouri, J., **Draoui, K.**, El Kadib, A Phosphorylation triggered growth of metal phosphate on halloysite and sepiolite nanoparticles: Preparation, entrapment in

chitosan hydrogels and application as recyclable scavengers New Journal of Chemistry 44, 33, 7 2020, 14136-14144/ FI 3.591

27-M.Ahrouch, J.M.Gatica, **K.Draoui**, D.Bellido, H.Vidal, Honeycomb filters as an alternative to powders in the use of clays to remove cadmium from water Chemosphere, , 259, 127526 (2020)/ FI 8.94

28-Lahcen Bouna, Abdellah Ait El Fakir, Abdeljalil Benlhachemi, **Khalid Draoui**, Mohamed Ezahri, Bahcine Bakiz, Sylvie Villain, Frederic Guinneton, Noureddine Elalem Synthesis and characterization of mesoporous geopolymer based on Moroccan kaolinite rich clay Applied Clay Science 196, 2020, 105764/ FI 5.9

29-Nisrine Hammi,Samir ElHankari, Nadia Katir, Nathalie Marcotte, **Khalid Draoui**, SebastienRoyer, AbdelkrimEl Kadib ; Polysaccharide templated biomimetic growth of hierarchically porous metal-organic frameworks, Microporous and Mesoporous Materials Volume 306, 15 October 2020, 110429/ FI 5.87

30-Natalia Wrońska, Aicha Anouar, Mounir El Achaby, Katarzyna Zawadzka, Marta Kędzierska, Katarzyna Miłowska, Nadia Katir, **Khalid Draoui**, Sylwia Różalska, Ireneusz Piwoński, Maria Bryszewska, Abdelkrim El Kadib Chitosan-functionalized graphene nanocomposite films: interfacial interplay and biological activity, , Materials 2020, 13,998 / FI 3.623

31- N. Ben Seddik , I. Raissouni , **K. Draoui** , A. Aït Aghzzaf , A. Chraka , B. Aznag , F. Chaouket , D. Bouchta Anticorrosive performance of lanthanum ions intercalated Stevensite clay on brass in 3% NaCl medium Materials Today: Proceedings 22 (2020) 78–82

32-Lahcen Bouna , Abdellah Ait El Fakir , Abdeljalil Benlhachemi , **Khalid Draoui** , Sylvie Villain , Frederic Guinneton Physico-chemical characterization of clays from Assa-Zag for valorization in cationic dye methylene blue adsorption Materials Today: Proceedings 22 (2020) 22–2723 12

33-Baragh F., **Draoui K.**, El Bali B., Kherbeche A., Agunaou M. (2020) Response Surface Methodology for the Optimization of 4-Nitrophenol Degradation by a Heterogeneous Fenton-Like Reaction on Moroccan Pillared Clays. In: Ezziyyani M. (eds) Advanced Intelligent Systems for Sustainable Development (AI2SD'2019). AI2SD 2019. Advances in Intelligent Systems and Computing, vol 1104. Springer, Cham

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## 8- CONFERENCE COMMUNICATIONS

More than 300 papers presented at international and national conferences (lectures, oral presentations and posters)

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## 9- Language :

Langues	Arabe	Anglais	Français	Espagnol
Lue	Maternelle	Excellent	Excellent	Excellent
Ecrite	Maternelle	Bien	Excellent	Excellent
Parlée	Maternelle	A. Bien	Excellent	Excellent