

**Mohammed Bazzaoui,**  
07/04/1971 - Morocco  
Married, 3 children  
Laboratory of Materials and Environment (LME)  
Département de Chimie, Faculté des Sciences,  
Ibn Zohr University - Faculty of Science - Agadir - Morocco  
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**Current occupation:**

**Full Professor**

Department of Chemistry - Ibn Zohr University - Agadir

**Education:**

2003- PhD degree in Engineering Science - Univ. of Porto (FEUP, Portugal)  
1997- Master degree in Physical chemistry - Ibn Tofail Univ. (Kénitra, Morocco)  
1996- Graduation in Organic chemistry / Physical chemistry - Med 1st Univ. (Oujda, Morocco)  
1992- General Certificate of Education Advanced Level (baccalauréat) in mathematical sciences - Abdelmoumen high school . (Oujda, Morocco).

**Main research area:**

Applied electrochemistry; Conducting polymers; Corrosion; Sensors; Metal coatings; Batteries; Fuel cells; Impedance spectroscopy.

**Scientific expert** Evaluator for CNRST and UM6P from September 2019

**Scientific publications:** 110 International journals - 140 International communications and conferences

**Recent publications:**

**1– Poly(methylene blue) Modified PLA-CB Conductive 3D Printer Filament as a Promising Platform for Electrochemical Sensing of Uric Acid.** M. El Fazdoune, · K. Bahend, · M. Oubella, S. Ben Jadi, A. El Guerraf, E.A. Bazzaoui, · F. J. García-García · J. I. Martins, M. Bazzaoui, *Journal of Polymers and the Environment* (in press 2023. <https://doi.org/10.1007/s10924-023-03100-9>)

**2– Different electrochemical techniques for the electrosynthesis of poly methylene blue in sodium saccharin aqueous medium.** M. El Fazdoune, K. Bahend, S. Ben Jadi, M. Oubella, F. J. García-García, E. A. Bazzaoui, A. Asserghine, M. Bazzaoui, *Solid State Electrochem* **27** (2023) 667

**3– Fabrication and Characterization of Oxygen-Carbon-Contained CrMnFeCoNi Coatings Electrodeposited in DMF-CH<sub>3</sub> CN Solution with and without Supporting Electrolyte LiClO<sub>4</sub>.** T. Xiao, R. Wang, Eishi Tanabe, Y. Satoh, M. Bazzaoui, Y. Ling, Z. Lu, *Coatings* **12** (2022) 1804.

**4– Electrochemical Synthesis and Characterization of Poly(Rhodamine B) Coating on FTO.** K. Bahend, M. El Fazdoune, S. Ben Jadi, A. El Guerraf, A. Asserghine, C. M. Sánchez-Sánchez, E. A. Bazzaoui, F. J. García-García, M. Bazzaoui, *Journal of The Electrochemical Society*, **169** (2022) 113502.

**5– Low potential electropolymerization and copolymerization of diphenylamine on aluminium.** M. Bouabdallaoui, Z. Aouzal , S. Ben Jadi, M. Bazzaoui, R. Wang, E.A. Bazzaoui, *Electrochimica Acta* **430** (2022) 141016.

**6– Antibacterial activity and volatile organic compounds sensing property of polypyrrole-coated cellulosic paper for food packaging purpose.** A. El Guerraf, S. Ben Jadi, N.K. Bakirhan, M.E. Kiymaci, M. Bazzaoui, S.A. Ozkan, E.A. Bazzaoui, *Polymer Bulletin* **79** (2022):11543–11566

**7– Effective electrodeposition of poly(3,4-ethylenedioxythiophene) -based organic coating on metallic food packaging for active corrosion protection.** A. El Guerraf, S. Ben Jadi, Z. Aouzal, M. Bouabdallaoui, N.K. Bakirhan, S.A. Ozkan, M. Bazzaoui, E.A. Bazzaoui, *Journal of Applied Electrochemistry* **52** (2022):1383–1407

**8– Extremely adherent and protective polymeric coating based on polydiphenylamine electrodeposited on steel in an organic electrolytic medium.** M. Bouabdallaoui, A. El Guerraf, Z. Aouzal, M. Bazzaoui, R. Wang, E.A. Bazzaoui, *Journal of Polymer Research* **29** (2022): 357

**9– Electrodeposition of strictly  $\alpha,\alpha'$ -polythiophene chains on oxidizable metals in acidic concentrated aqueous media.** M. Bouabdallaoui, Z. Aouzal, A. El Guerra, M. Bazzaoui, E.A. Bazzaoui, *J. Electrochem. Sci. Eng.* **12** (2022) 617-638.

**10– Fabrication and Characterization of Oxygen-Carbon-Contained CrMnFeCoNi Coatings Electrodeposited in DMF-CH<sub>3</sub>CN Solution with and without Supporting Electrolyte LiClO<sub>4</sub>.** T. Xiao, R. Wang, E. Tanabe, Y. Satoh, M. Bazzaoui, Y. Ling, Z. Lu, *Coatings* **12** (2022) 1804

**11– Roughened gold electrode for in situ SERS analysis of structural changes accompanying the doping process of polyaniline in acidic aqueous media.** A. EL Guerra, M. Bouabdallaoui, Z. Aouzal, S. Ben Jadi, N. K. Bakirhan, M. Bazzaoui, S. A. Ozkan, E. A. Bazzaoui, *Journal of Electroanalytical Chemistry*, **882** (2021) 115034.

**12– PEDOT for Sensitive Electrochemical Detection of Trimetazidine Hydrochloride in Biological Fluids: Synthesis, Characterization and Mechanism Insights.** A. EL Guerra, N. K Bakirhan, S. Ben Jadi, M. Bazzaoui, Y. Ozkan, E. A. Bazzaoui, S. A. Ozkan, *Journal of the Electrochemical Society*, **167** (2020) 167525.

**13– Analyses of scanning electrochemical microscopy and electrochemical impedance spectroscopy in direct methanol fuel cells. Permeability resistance and proton conductivity of polyaniline modified membrane.** S. Ben Jadi, A. EL Guerra, A. Kiss, A. El Azrak, E. A. Bazzaoui, R. Wang, J. I. Martins, M. Bazzaoui, *J Solid State Electrochemistry*, **24** (2020) 1551-1565.

**14– Using Atomic Force Microscopy to Measure Thickness of Passive Film on Stainless Steel Immersed in Aqueous Solution.** R. Wang, Y. Li, T. Xiao, L. Cong, Y. Ling, Z. Lu, C. Fukushima, I. Tsuchitori, M. Bazzaoui, *Scientific Reports*, **9**, (2019)13094.

**15– Synthesis, characterization, and transport properties of Nafion-Polypyrrole membrane for Direct Methanol Fuel Cell (DMFC) application.** S. Ben Jadi, A. EL Guerra, E. A. Bazzaoui, R. Wang, J. I. Martins, M. Bazzaoui, *J Solid State Electrochemistry*, **23** (2019) 2423-2433

**16– Electrosynthesis of Zinc Phosphate-Polypyrrole coatings for improved corrosion resistance of steel.** A. El Jaouhari, A. Chennah, S. Ben Jadi, Y. Naciri, Z. Anfar, H. Ait Ahssaine, A. Benlhachemi, M. Bazzaoui, *Surfaces and Interfaces*. **15** (2019) 224-231.

**17– Electrochemically roughened silver surface versus fractal leaf-shaped silver crystals for surface-enhanced Raman scattering investigation of polypyrrole.** A. EL Guerra, Z. Aouzal, M. Bouabdallaoui, S. Ben Jadi, A. EL Jaouhari, R. Wang, M. Bazzaoui, E. A. Bazzaoui, *J Solid State Electrochemistry*, **23** (2019) 1811-1827.

**18– Synthesis and spectroscopic characterization of polypyrrole PPy coating on flax fibers and its behaviour toward volatile vapors.** A. El Jaouhari, S. Ben Jadi, A. El Guerra, M. Bouabdallaoui, Z. Aouzal, E.A. Bazzaoui, J.I. Martins, M. Bazzaoui, *Synthetic Metals* **245** (2018) 237-244.

**19– Comparison study between corrosion protection of polypyrrole synthesized on stainless steel from phthalate and saccharinate aqueous medium.** A. El Jaouhari, S.Ben Jadia, Z. Aouzal, M.Bouabdallaoui, E.A. Bazzaoui, R. Wang, M. Bazzaoui *Polymer Testing* **67** (2018) 302-308.

**20– Experimental and MDS studies of corrosion inhibition of carbon steel by saccharinate sodium.** A. El Jaouhari. S. Kaya. S. Ben Jadi. Z. Aouzal. M. Bouabdellaoui. E.A. Bazzaoui. Ş. Erdoğan, M. Bazzaoui., *Journal of Surfaces and Interfaces* **10** (2018) 11-18.

### **Recent Patents :**

– Nouveau procédé d'assemblage Anode/PEM/Cathode pour application à la technologie des piles à combustible. S. Ben Jadi, A, El Jaouhari, M. Bouabdallaoui, Z. Aouzal, A. El Guerra, E.A. Bazzaoui, M. Bazzaoui. *National Patent* MA 41871 A1/ 31.07.2019

– Nouveau procédé économique et respectueux de l'environnement pour la métallisation de la céramique en deux étapes. Z. Aouzal, M. Bouabdallaoui, S. Ben Jadi, A. El Jaouhari, M. Bazzaoui, R. Wang, J.I. Martins, E.A. Bazzaoui. *National Patent* MA 40119 A1/ 28.09.2018

### **Publications in conference proceedings or international congresses :**

**1– Synergistic effect between Ag and Cu for the observation of huge SERS signal of photochemically prepared polypyrrole. Application to toxic volatile organic compounds sensing.** A. EL Guerra, S. Ben Jadi, M. Bouabdallaoui, Z. Aouzal, R. Wang, M. Bazzaoui, E. A. Bazzaoui, *Materials Today: Proceedings*, **31** (2020) S1-S8.

**2– Improvement of the anticorrosion resistance of nickel by polypyrrole coating electrosynthesized in salicylate medium.** Z. Aouzal, M. Bouabdallaoui, A. EL Guerra, S. Ben Jadi, R. Wang, M. Bazzaoui, E. A. Bazzaoui, *Materials Today: Proceedings*, **31** (2020) S89-S95.

**3–Influence of polythiophene overoxidation on its physicochemical properties and corrosion protection performances.** M. Bouabdallaoui, Z. Aouzal, A. EL Guerraf, S. Ben Jadi, M. Bazzaoui, R. Wang, E. A. Bazzaoui, Materials Today:Proceedings, 31 (2020) S69-S74.

**4– Investigation of the geometry and anchoring mode of conducting polythiophene films electrosynthesized on aluminium working electrodes.** A. EL Guerraf, S. Ben Jadi, M. Bouabdallaoui, Z. Aouzal, M. Bazzaoui, J. Aubard, G. Lévi, E. A. Bazzaoui, Materials Today: Proceedings, 22 (2020) 73-77.

**5– Electropolymerization and corrosion resistance of polypyrrole on nickel bipolar plate for PEM fuel cell application.** S. Ben Jadi, A. EL Jaouhari, Z. Aouzal, A. EL Guerraf, M. Bouabdallaoui, R. Wang, E.A. Bazzaoui, M. Bazzaoui, Materials Today: Proceedings, 22 (2020) 52-56.

### **Proceeding :**

Materials Today PROCEEDINGS: Proceeding, Applied Materials for the Environment (CIMAE-2018), Volume 22, Issue P1 (2020) 1-146. ISSN 2214-7853-ELSEVIER

**Guest Editors:** Mohammed Bazzaoui, Abdelillah Shaim, Bahcine Bakiz, Nouredine El Alem, Mohamed Ezahri, Abdeljalil Benlhachemi and Aziz Taoufyq.

### **Communication orale dans un congrès ou dans un colloque international**

**1– The electrochemical polymerization of Rhodamine B and properties of poly(Rhodamine B films.** K. Bahend, M. El fazdoune, S. Ben Jadi, M. Bazzaoui, 6 th International Education and Innovative Sciences Congress, November 24-25, 2022 / Burdur Mehmet Akif Ersoy University, Turquie

**2– Development of conductive polymer coatings for corrosion protection on low carbon steel.** M. OUBELLA, M. AIT ALI, M. MAKHA, C. HEJAJ, M. BAZZAOUI. International Science and Innovation Congress, 11-12 Novembre 2022/ Ankara, Turquie

**3– Electrochemical synthesis and characterization of poly(Rhodamine B) coating on FTO.** K. Bahend, M. El fazdoune, S. Ben Jadi, M. Bazzaoui. Ankara International Congress on Scientific Research -VII, December 2-4, 2022 / Ankara, Turquie

**4– Conducting polymers-based films for corrosion prevention of metallic food Packaging.** A. El Guerraf, S. Ben Jadi, M. Bouabdallaoui, Z. Aouzal, R. Wang, M. Bazzaoui and E. A. Bazzaoui. International Icontech Symposium-4 on Innovative Surveys in Positive Sciences, July 2021, Adana – Turquie.

**5– Ex situ SERS analysis of polypyrrole using roughened Ag electrode and fractal leaf-shaped silver crystals.** A. El Guerraf, S. Ben Jadi, Z. Aouzal, M. Bouabdallaoui, M. Bazzaoui and E. A. Bazzaoui. 11 th International Congress on Mathematic, Engineering and Natural Sciences, January 2021, Karak – Jordan.

**6– Electrosynthesis of Strictly  $\alpha$ ,  $\alpha'$  Polythiophene Chains on Oxidizable Metals in Aqueous Media of Concentrated Acids.** M. Bouabdallaoui, Z. Aouzal, A. El Guerraf, M. Bazzaoui and E. A. Bazzaoui. International ICONTECH SYMPOSIUM-3 on Innovative Surveys in Positive Sciences, January 2021, Mohammed First University, Oujda – Morocco.

**7– Electrochemically synthesized polypyrrole and its behavior as an organic sensor towards ammonia vapors.** A. EL Guerraf, S. Ben Jadi, N. K. Bakirhan, S. A. Ozkan, M. Bazzaoui and E. A. Bazzaoui. International ICONTECH SYMPOSIUM-3 on Innovative Surveys in Positive Sciences, January 2021, Mohammed First University, Oujda – Morocco.

**8– Electrochemically synthesized polypyrrole and its behavior as an organic sensor towards ammonia vapors.** A. EL Guerraf, S. Ben Jadi, N. K. Bakirhan, S. A. Ozkan, M. Bazzaoui and E. A. Bazzaoui, International ICONTECH SYMPOSIUM-3 on Innovative Surveys in Positive Sciences, January 2021, Mohammed First University, Oujda – Morocco.

**9– Electrochemical Procedure for Obtaining Surface-Enhanced Raman Scattering Active Polypyrrole Films on massive silver plates.** A. El Guerraf, S. Ben Jadi, Z. Aouzal, M. Bouabdallaoui, M. Bazzaoui and E. A. Bazzaoui, 4<sup>th</sup> Edition of the International Virtual Conference on Materials & Environmental Science, ICMES-2020, November 2020, Mohammed First University, Oujda – Morocco.

**10– SECM and EIS studies for investigation of improved methanol permeability resistance and proton conductivity of perfluorinated low-density membranes by polyaniline coatings.** S. Ben Jadi, A. El Jaouhari, A. El Guerraf; M. Bouabdallaoui, Z. Aouzal, E.A. Bazzaoui, J. I. Martins, M. Bazzaoui, The Third International Conference on Material Science (ICMES), 18-20 December 2019, Agadir-Maroc

**11– Synthesis, characterization, and transport properties of Nafion-polypyrrole membrane for direct methanol fuel cell (DMFC) application.** S. Ben Jadi, A. El Guerraf, E. A. Bazzaoui, R. Wang, J. I. Martins and M. Bazzaoui. 6<sup>th</sup> International Symposium "Environment & Sustainable Development", October 2019, Rabat – Morocco.

**12– Surface-enhanced Raman scattering for precise rovibrational investigation of polypyrrole inner layers.** A. El Guerraf, S. Ben Jadi, Z. Aouzal, M. Bouabdallaoui, M. Bazzoui and E. A. Bazzoui, 10<sup>th</sup> National Meeting of Electrochemistry RNE'10, April 2019, Ifrane – Morocco.

**13– Enhancement in methanol resistance of perfluorinated membrane induced by polyaniline coating for direct methanol fuel cells.** S. Ben Jadi, A. El Jaouhari, A. El Guerraf, Z. Aouzal, M. Bouabdallaoui, E. A. Bazzoui, R. Wang, M. Bazzoui. 5<sup>eme</sup> Journée Internationales Matériaux et Environnement, 14-15 Mars 2019, Agadir/Ait Melloul, Maroc.

**14– Elemental and structural investigation of polythiophène electrodeposited on SERS-activated working electrodes.** A. El Guerraf, S. Ben Jadi, M. Bouabdallaoui, Z. Aouzal, M. Bazzoui and E. A. Bazzoui, 2<sup>nd</sup> Scientific Day of Doctoral Training in Applied Chemistry and Environment, February 2019, Mohammed First University, Oujda – Morocco.

**15– XPS and SERS spectroscopies for the investigation of conducting polymer inner layers.** A. El Guerraf, Z. Aouzal, M. Bouabdallaoui, S. Ben Jadi, M. Bazzoui and E. A. Bazzoui, International Congress: Materials Applied to the Environment, December 2018, Ibn Zohr University, Agadir – Morocco.

**16– Lightweight bipolar plates based on CU/PPY/PMMA and NI/PPY/PMMA for PEMFCs.** S. Ben Jadi, A. El Guerraf, A. El Jaouhari, M. Bouabdallaoui, Z. Aouzal, E.A. Bazzoui, R. Wang, M. Bazzoui. Congrès International: Matériaux Appliqués à l'Environnement CIMAIE-2018. Agadir-Morocco, 5-7 décembre 2018.

**17– SERS investigation of polythiophene/electrode interface.** A. El Guerraf, E. A. Bazzoui, Z. Aouzal, M. Bouabdallaoui, S. Ben Jadi, M. Bazzoui, J. Aubard and G. Lévi, International Symposium Science and Technology at the service of the Environment, June 2018, Abdelmalek Essadi University, Tétouan – Morocco.

**18– Effect of Conducting Polymers Coatings on Nafion Methanol Crossover in Direct Methanol Fuel Cell (DMFC).** S. Ben Jadi, Z. Aouzal, A. El Jaouhari, M. Bouabdallaoui, A. Guerraf, E. A. Bazzoui, R. Wang, M. Bazzoui. *22nd ISE Topical Meeting*. Tokyo-Japan, 15 - 18 April 2018.

### Research projects coordinator

#### • Projet 1 (projet national)

Intitulé du projet	<b>Nouvelle technologie simple, économique et respectueuse de l'environnement pour la métallisation des pièces plastiques. Applications dans les industries automobiles et aéronautiques</b>
Caractère	<input type="checkbox"/> Local ou régional <input checked="" type="checkbox"/> National <input type="checkbox"/> International
Période contractuelle du Projet	3 ans ( <b>2022-2025</b> )
Coordonnateur local	<b>Mohammed Bazzoui</b>
Partenaires (Université, municipalité...)	<i>CNRST-UM6P- MESRSFC</i>

#### • Projet 2 (projet national)

Intitulé du projet	<b><i>Procédé innovant économique et respectueux de l'environnement pour la métallisation des plastiques et céramiques en deux étapes. Application industrielle</i></b>
Caractère	<input type="checkbox"/> Local ou régional <input checked="" type="checkbox"/> National <input type="checkbox"/> International
Période contractuelle du Projet	4 ans ( <b>2019-2023</b> )
Coordonnateur local	<b>Mohammed Bazzoui</b>
Partenaires (Université, municipalité...)	Université Ibn Zohr, Université Mohamed Ier, Cité d'Innovation de Agadir

#### • Projet 3 (projet national dans les domaines prioritaires)

Intitulé du projet	Etude conception et mise au point d'une pile à combustible miniature à base de polymères conducteurs
Caractère	<input type="checkbox"/> Local ou régional <input checked="" type="checkbox"/> National <input type="checkbox"/> International
Période contractuelle du Projet	7 ans ( <b>2016-2024</b> )
Coordonnateur local	<b>Mohammed Bazzoui</b>
Partenaires (Université, municipalité...)	MESRSFC et CNRST

• **Projet 4 (projet national)**

Intitulé du projet	<b>Conception et étude d'un capteur portable destiné à la détection des vapeurs toxiques en utilisant des polymères électroactifs et leurs dérivés</b>
Caractère	<input type="checkbox"/> Local ou régional <input checked="" type="checkbox"/> National <input type="checkbox"/> International
Période contractuelle du Projet	2 ans (2019-2020)
Coordonnateur local	<b>Mohammed Bazzaoui</b>
Partenaires (Université, municipalité...)	Université Ibn Zohr- Université Mohamed Ier

• **Projet 5 (projet national)**

Intitulé du projet	<b>Elaboration, étude et mise au point d'une cellule solaire à colorants (DSSC) à faible coût</b>
Caractère	<input type="checkbox"/> Local ou régional <input checked="" type="checkbox"/> National <input type="checkbox"/> International
Période contractuelle du Projet	2 ans (2016-2018)
Coordonnateur local	<b>Mohammed Bazzaoui</b>
Partenaires (Université, municipalité...)	Université Ibn Zohr- Université Mohamed Ier

• **Projet 6 (projet international)**

Intitulé du projet	Concept and investigation of sensors prepared by polypyrrole, polyaniline and polythiophene and their derivatives for volatile organic vapors and toxic gases sensing
Caractère	<input type="checkbox"/> Local ou régional <input type="checkbox"/> National <input checked="" type="checkbox"/> International
Période contractuelle du Projet	(2 ans) 2015-2017
Coordonnateur local	<b>Mohammed Bazzaoui</b>
Partenaires (Université, municipalité...)	Convention CNRST/NIH (Maroc/Hongrie)

• **Projet 7 : (projet international)**

Intitulé du projet	Synthesis and characterization of conductive electroactive polymers and their usability for metallization of plastics
Caractère	<input type="checkbox"/> Local ou régional <input type="checkbox"/> National <input checked="" type="checkbox"/> International
Période contractuelle du Projet	(2 ans) 2015 – 2017
Coordonnateur local	<b>Mohammed Bazzaoui</b>
Partenaires (Université, municipalité...)	Convention CNRST/TUBITAK (Maroc/Turquie)