

Xochitl Dominguez-Benetton

Senior scientist – (bio)electrochemical technology, resource recovery

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Profile highlights

Adaptable and highly ethical (bio)electrochemical engineer with excellent research record in the fields of resource recovery, processing and valorization, with experience in academia and applied research, who aims to implement an enduring independent and collaborative research program in the field of sustainable materials processing.

My recent achievements demonstrate that I have the capacity to rapidly start up and achieve outstanding academic outcomes. During the course of my current appointment, these include:

- **I contested my ERC Starting Grant interview in September 2015** - Panel on Physical Science and Engineering / European Commission (under evaluation)
- **In the past three years I acquired and run an independent research portfolio of ~3.5 million euros** with projects funded at Institutional, European and International levels
- Actively participated on the working teams that led to establish the **EIT KIC Raw Materials** and the **SIM MaRes Programme**
- Reached **h-index 10** with **over 30 SCI publications** included in **journals with impact factor up to 33.38**
- Filed **4 patent applications** of which 2 are currently inspected for industrial prospection
- Hold several awards, especially on innovation
- Currently **co-promoting 5 PhD theses on resource recovery**. Formerly co-promoted 7 Master, 4 BS and 2 postdoctoral projects

Within a framework of 2-5 years **I want to become a consolidated scientist in (bio)electrochemistry, primarily for metal recovery and valorization as well as for the electrosynthesis of crystalline functional nanomaterials**. By the end of 2016 I anticipate to have at least h-index >20, filed 2 more patent applications and ensure an additional million euros to keep conducting independent and collaborative research.

Current duties

SENIOR SCIENTIST
(Bio)Electrochemical technology
Flemish Institute for Technological Research - VITO
Belgium

ADVISOR
Emerging technologies innovation
EmTechHub
Ireland

ADVISOR
Advisory Panel Member
Elsevier
Global initiative

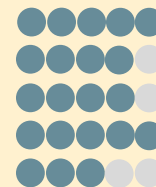
COORDINATOR R&D
Chapter Belgium
Global Network of Mexican Talents
Belgium

EXPERT EVALUATOR
NMP calls H2020
European Commission
Belgium

Skills

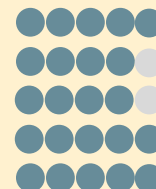
PROFESSIONAL

Scientific strategy
Research execution
Mentoring/teaching
Experimentalist
Modeling



PERSONAL

Self-driven
Critical thinker
Collaborative
Persistent
Industrious



Extended CV

Career history and key achievements

2011 – now

SENIOR SCIENTIST

VITO

Belgium

- Defended ERC Starting Grant proposal at invited interview stage (currently under evaluation)
- Main inventor of a new patent pending electrochemical technology that removes and recovers metals and metalloids from aqueous matrices and synthesizes a wide variety of crystalline nanomaterials with wide functionality
- Co-inventor of three pending patents in the field of electrochemistry
- Guaranteed and run successfully a research portfolio of ~3.5 million euros with projects funded at institutional, European and International levels
- Co-founded the electrochemistry team and equipped a state of the art electrochemistry laboratory
- Co-defining market potential and strategy for VITO-Mexico prospection

2010 – 2011

RESEARCH ENGINEER

ENSIACET – INP-TOULOUSE

France

- Co-invented a patent pending process to convert CO₂ to glycerol via cathodic microbial electrochemistry
- Holder of the laureate to innovation INPT 2012
- Co-discovered salt-marsh communities as inoculum source to develop electrochemically-active anodic biofilms producing high current densities
- Qualified for the functions of “maître de conférences” (Conseil National des Universités)

2008 - 2010

RESEARCH PROFESSOR

UADY

Mexico

- Coordinated the development of a new study plan for biotechnology engineers which was implemented in 2011
- Holder of the 2nd Santander laureate on entrepreneurial innovation (national)
- Guaranteed and ran successfully a research portfolio of ~200k euros with projects funded at National level

2003 – 2007

DOCTORAL RESEARCHER

MEXICAN PETROLEUM INSTITUTE

Mexico

- Co-implemented an industrial project to remotely detect failures in oil and gas industry pipelines with electrochemical impedance spectroscopy
- Holder of a CONACyT (National Council of Science) full scholarship for PhD
- Guaranteed and ran successfully ~50k euros for my PhD research at institutional level

2004 – 2005

TEACHING ASSISTANT

UNAM

Mexico

- Assisted on lecturing theoretical and practical courses on electronics for electrochemistry and advanced methods in electrochemistry

2003 – 2004

TEACHING ASSISTANT

UPIBI - IPN

Mexico

- Assisted on lecturing theoretical and practical courses on plant and animal cell cultures
- Developed material for directed practical work on plant and animal cell cultures

2003 – 2006

CONSULTING ENGINEER

NATURAL ADSORBENTS

Mexico

- Co-established a research and production laboratory to cultivate entomopathogenic fungi for the control of sugar cane plagues
- Improved industrial scale composting of sugar cane farming residues
- Co-developed a commercial product based on clays (bentonite and zeolite) for the control of coccidiosis in large-scale poultry farming

Studies

2003 – 2007

MASTER AND DOCTORATE: BIOCORROSION

MEXICAN PETROLEUM INSTITUTE

PHYSICOCHEMISTRY OF HYDROCARBONS DIVISION

Mexico

- Global grade: 9.2/10
- Doctoral dissertation grade: 10/10, honorific mention by the Mexican Society of Electrochemistry
- Thesis: Biocomplexity and electrochemical influence of biofilms in carbon steel deterioration in gasoline-containing environments
- Promoters: Prof. Homero Castaneda, Dr. Bernard Tribollet (UPR15 du CNRS, LISE)
- Master: equivalence of master credits granted (National examination National EXANI III: top 5 percentile)

2003 – 2004

DIPLOMATE: GENOMIC RESEARCH

UNIVERSITY OF MEXICO CITY

SCIENCE AND TECHNOLOGY COLLEGE

Mexico

- Short thesis: Genomic research in microbial biofilms
- Promoter: Dr. Carlos Amabile Cuevas

2003 - ...

DIPLOMATE/ PLANT AND ANIMAL CELL CULTURES

UNIVERSIDAD COMPLUTENSE DE MADRID

FACULTY OF MEDICINE

Spain

- Global grade: 9/10 (outstanding mention)
- Promoter: Prof. Pablo Gil Lozaga

2003 – 2004

ACADEMIC BACHELOR: BIOTECHNOLOGY ENGINEERING

NATIONAL POLYTECHNIC INSTITUTE

BIOTECHNOLOGY UNIT

Mexico

- Global grade: 8.21/10
- Specialty: Agropecuary biotechnology
- Thesis: Study on corrosion initiation on carbon steel by sulfate-reducing bacteria
- Promoters: Dr. Didier Alazard (IRD, France), M. Patricia Rodriguez Pascual

Scientific research

The goal of scientists is you hope that the thing you are working on is bigger than the thing you are pipetting into that tube at that moment.

— Bonnie Bassler

SCIENTIFIC LEADERSHIP POTENTIAL

I graduated from my PhD in 2008 in Mexico, in biocorrosion. I **demonstrated the formation of profuse active corrosion sites on carbon steel due to the influence of sulfate-reducing bacteria (SRB)**, which accelerated the rate of corrosion by 2–3 orders of magnitude as compared to analogous abiotic conditions (Castaneda & Dominguez-Benetton, Corr. Sci. 2008, cited >80 times, top 25 hottest articles in Corr. Sci., ScienceDirect Jan.-Mar. 2008). Biocorrosion was a known phenomenon, but **my work was one of the first consistent proofs linking unmistakable biofilm growth, a reliable electrochemical response and evident surface damage**. Recently, this work served as a starting point to discover that SRB can achieve direct electron transfer with solid state electrodes (Venzlaff et al. 2013 Corr. Sci.), with wide implications in bioproduction and resource recovery, besides showing the largest current densities so far reached for microbial biocathodes (Sharma et al. 2013 Chemm. Comm.). For these and other related works today **I am generally recognized as one of the top experts on electrochemical methods and engineering within the community of microbial electrochemical systems (MES)**.

Due to my convictions to generate higher value from fundamental research to society and industry, **I have extended my interests to non-microbial electrochemistry, where I can make more tangible and prompt impacts**. With my group we have recently demonstrated the accelerated electrosynthesis of H₂O₂ with gas-diffusion electrodes, using weak acids as co-catalysts [Alvarez-Gallego & Dominguez-Benetton 2014 EP14179927], which raised interest from Proviron, Taminco and Zwembad. More **recently I developed a new electrochemical technology**, which I coined **gas-diffusion electrocrystallization** (Dominguez-Benetton et al. 2015 EP15150649). For its more robust application on recovery of critical metals materials from aqueous matrices, it rapidly **raised interest from 8 Flemish companies** (BP Chembel, Bekaert, Trevi, Envisan...) who are stakeholders in the SIM-MaRes SBO proposal Get-A-Met (currently under evaluation) **and several European companies** like Tasman Metals (SE), Paques (NL), 6t-mic Engineering (FR) and Tecnicas Reunidas (ES). Besides, **VITO is currently prospecting a spin-off based on this concept**, for which the business plan will be drafted in 2015. From the perspective of synthesis of disperse nanoparticle composites, **my candidacy with gas-diffusion electroscystallization as a frontier scientific development is currently being judged by the European Commission for an ERC starting grant**, having

defended the invited interview for the 2015 call. These are proofs of scientific excellence of my research as well as of its industrial and societal relevance.

Currently I run a project portfolio of ~€3.5M. I have over 30 SCI publication, over 10 invited international presentations and more than 40 international presentations in scientific conferences. I have several awards, especially on innovation. I am article reviewer for diverse SCI journals, and expert reviewer for Horizon 2020 (EC, NMP calls) and CONACyT (Mexico). In the years to come I want to continue to run an independent research program on resource recovery and sustainable materials processing and make a broad impact in electrochemistry, nanomaterials, and critical raw materials. Within a framework of 5-8 years I want to become a consolidated and leading scientist in these fields. The achievements in terms of scientific output, funding and recognition, as well as my leading experience indicate that I have the capacity to rapidly start up and achieve world-class outcomes.

RESEARCH FUNDS

PAST GRANTS

Project Title	Funding source	Amount (Euros)	Period	Role
Production of statins through rice fermentation to obtain a drug usable in the control of metabolic disorders caused by diabetes and obesity	Project FOMIX-Yucatan 2008 : 107984; National Science Council CONACyT, Government of Yucatan	€120,000	May 2009-May 2010	Scientific leader.
Effective utilization and up-scaling of microbial fuel cells for wastewater treatment and electricity generation	CONACyT 2008-2009, Retention project; National Science Council CONACyT, Mexico	€4,500	Jul 2008-Jun 2009	Scientific leader.
Development of microbial fuel cells for domestic wastewater remediation and optimization through directed bioelectrogenesis	CONACyT 2008, Ciencia basica; National Science Council CONACyT, Mexico	€35,000	Jan 2009 - May 2010	Scientific leader.

ONGOING GRANTS

Project Title	Funding source	Amount (Euros)	Period	Role
Pre-feasibility of an Electro-Fenton process	Competitive research. Company: Taminco.	Total project €10,000.	Dec 2014- Dec 2015	Scientific leader.
Recovery of elements using electrochemistry	VITO Strategic research fund.	Total project €390,000.	Nov 2013- Dec 2015	Scientific leader. Research execution.
InFluENCE. Interfaces of Fluid Electrodes: New Conceptual Explorations	European Commission. FP7	Total project €3,500,000. VITO contribution €802,000.	Sep 2013- Aug 2016	Task leader. Research execution.

Project Title	Funding source	Amount (Euros)	Period	Role
Recovery of embedded oil and density upgrading (API) of heavy and extra heavy crude oils via <i>in situ</i> hydroprocessing	Council of Science and Technology (CONACyT). Ministry of Energy (SENER). Mexico.	Total project €32,000,000. VITO contribution €1,360,000.	Dec 2013- Dec 2016	Work package leader. Scientific leader at VITO.
PhD project: Electrochemical technology for the recovery of metals	VITO Strategic research fund.	Total project €273,000	Feb 2015- Jan 2019	Scientific leader.
Horizon 2020, CHPM2030 Combined heat, power and metal extraction from ultra-deep ore bodies proposal	European Commission. H2020 654100.	Total project €4,235,567. VITO contribution €942,000	Dec 2015- Jun 2019	Work package leader. Scientific leader at VITO.
Get-A-Met, Groundbreaking extraction technology for critical metals and metalloids from industrial wastewaters	Flemish Strategic Initiative Materials in Flanders.	Total project €1,967,185. VITO contribution €790,000.	Feb. 2015- Jan. 2019.	Coordinator. Work package leader. Scientific leader at VITO.

ONGOING APPLICATIONS

Proposal Title	Funding source	Amount (Euros)	Period (expected)	Role of the PI
ERC Starting Grant ElectroGaDGet	European Commission. H2020	€1,500,000	Jan. 2015- Dec. 2019.	Beneficiary.
Horizon 2020, MCSA-IF. MET4MET, Microbial electrochemical technologies for sustainable critical metal recovery	European Commission.	Total project €160,800.	Sept. 2015- Aug. 2017.	Hosting researcher.

In addition, I participated on the **preparation team for the EIT Raw Materials** since 2013, which was granted by the European Commission. The EIT (KIC Raw MatTERS) brings together >100 partners from 20 different EU Member states. The goal for the EIT KIC Raw MatTERS is to boost the competitiveness, growth and attractiveness of the European raw materials sector with the cooperation and partnership of leading research institutions and enterprises. <http://tinyurl.com/lq4bfxp> I also participated since 2013 on the **preparation of the Flemish program MaRes 'Materials from solid and liquid industrial process Residues'**, which aims at creating and demonstrating an operational, flexible toolbox to recover metals and valorize residual matrix into building materials. The program was granted by the Strategic Innovative Materials initiative in Flanders. MaRes brings together various industrial stakeholders and three knowledge institutes representing the full value chain from end-of-life product recycling and residue production, to preprocessing, water treatment and metal recovery, to mineral valorization of new materials. **I am the coordinator of the pillar on aqueous streams.** <http://www.sim-flanders.be/research-program/mares>. Finally, I participate on the **EIP action groups: EIP Raw Materials Commitment MetGrow** and the **EIP Water Commitment MEET-ME4WATER**.

SCIENTIFIC PRODUCTION

A full list of publications and presentations is provided in a separate annex. Here, only a summary is presented.

AS PRIMARY OR SENIOR AUTHOR (5 SELECTED)

- Lepage G., Perrier G., Merlin G., Aryal N., Dominguez-Benetton X. (2014) Multifactorial evaluation of the electrochemical response of a microbial fuel cell. *RSC Adv.* 4, 23815–23825. **IF: 3.708. Cit: 4.**
- Sharma M., Bajracharya S., Gildemyn S., Patil S.A., Alvarez-Gallego Y., Pant D., Rabaey K., Dominguez-Benetton X. (2014) A critical revisit of the key parameters used to describe microbial electrochemical systems. *Electrochim. Acta.* 140:191–208. **IF: 3.777. Cit: 15.**
- Dominguez-Benetton X., Sandipam S., Satyawali Y., Vanbroekhoven K., Pant D. (2013) Enzymatic Electrosynthesis: An overview on the progress in enzyme-electrodes for the production of electricity, fuels and chemicals. *J. of Microb. & Biochem. Technol.* 5:88-107. **IF: 2.16. Cit: 8.**
- Dominguez-Benetton X., Sevda S., Vanbroekhoven K. Pant D. (2012) The accurate use of impedance analysis for the study of microbial electrochemical systems. *Chem. Soc. Rev.* 41:7228–7246. **IF: 30.425. Cit: 54.**
- Castaneda H. and Dominguez-Benetton X. (2008) SRB-biofilm influence in active corrosion sites formed at the steel-electrolyte interface when exposed to artificial seawater conditions, *Corr. Sci.* 50(4):1169–1183. **IF: 4.42. Cit: 96.**

RECENT PUBLICATIONS AS COLLABORATIVE AUTHOR (5 SELECTED)

- Babu S., Sandipam S., Dominguez-Benetton X, Mohan S.V. Pant D (2015) Dual gas diffusion cathode design for MFC: optimizing the suitable mode of operation in terms of bioelectrochemical and bioelectrokinetic evaluation. *J. Chem. Technol. Biotechnol.* **IF: 2.494. Cit: 5.**
- Sevda S., Dominguez-Benetton X., Vanbroekhoven K., De Wever H., Sreerishnan T.R., Pant D. (2013) High strength wastewater treatment accompanied by power generation using air cathode microbial fuel cell. *Appl. Energy.* 105:194–206. **IF: 5.261. Cit: 64.**
- ElMekawy A, Hegab HM, Dominguez-Benetton X, Pant D (2013) Internal resistance of microfluidic MFC: challenges and potential opportunities. *Biores. Technol.* 142:672–682. **IF: 4.750. Cit: 42.**
- Rousseau R., Dominguez-Benetton, X., Délia M.L., Bergel A. (2013) Microbial bioanodes with high salinity tolerance for MFCs and microbial electrolysis cells. *Electrochem. Comm.* 23:1–4. **IF: 4.287. Cit: 19.**
- Alvarez-Gallego Y., Dominguez-Benetton X., Pant D., Diels L., Vanbroekhoven K., Genné I., Vermeiren P. (2012) Development of gas diffusion electrodes for cogeneration of chemicals and electricity. *Electrochim. Acta.* 82:415–426. **IF: 4.086. Cit: 21.**

GRANTED PATENTS

I do not have granted patents up to date, but I have patent applications wherein two (marked by *) are being evaluated for industrial pre-feasibility.

- Dominguez Benetton X, Alvarez Gallego Y, Porto-Carrero C, Chayambuka K, Gijbels K (2015) An electrochemical process for isolating a metal or metalloid ion from a water soluble precursor. EP15150649. *Priority date: 09.01.2015.* European Application Status.*
- Dominguez Benetton X, Alvarez-Gallego Y (2014) A device and method for the production of hydrogen peroxide. EP14179927. *Priority date: 05.08.2014.* European Application Status.*
- Alvarez-Gallego Y, Pant D, Dominguez Benetton X, Bouwman B (2013) Current density distributor for use in an electrode. WO2014131799 A1. *Priority date: 26.02.2013.* International filing date: 26.02.2014. Publication date: 04.09.2014. International Application Status. PCT.
- Soussan L, Dominguez-Benetton X, Erable B, Etcheverry L, Delia ML, Bergel A (2013) Process for the electrochemical reduction of CO₂ catalysed by an electrochemically active biofilm. FR20110057703. *Priority date: 31.08.2011.* International filing date: 31.07.2012. Publication date: 07.03.2013. International Application Status. PCT.

INVITED PRESENTATIONS (5 SELECTED)

- Dominguez-Benetton X (2015) Phase transformation and recovery of phase-changing elements from aqueous solutions using capacitive electrodes. 7th European Summer School on Electrochemical Engineering. Leeuwarden, The Netherlands.
- Dominguez-Benetton X (2014) Electro-driven separations and conversions to recover critical elements. IMETE Summer School 2014. Int. Wat. Assoc. Erasmus Mundus. Gent University. Gent, Belgium.
- Dominguez-Benetton (2014) EIS as a tool in bioelectrochemistry. EU Workshop on Electrochem. Impedance Spectroscopy, Fundamentals and Applications. Invited lecture. DECHEMA. Frankfurt, Germany.
- Dominguez-Benetton X, Rabaey K (2013) Microbial electrocatalysis. Invited Tutorial Lecture. 64th Annual Meeting of the International Society of Electrochemistry, Queretaro, Mexico.
- Dominguez-Benetton X (2012) Electrochemical impedance spectroscopy in the evaluation of microbial electrochemical technologies. 1st EU Meeting of ISMET. Invited keynote presentation. Gent, Belgium.

EDITORIAL ACTIVITIES

Regular reviewer for the following SCI Journals: Water Resources, Bioresource Technology, Electrochimica Acta, RSC Advances, RSC Energy and Environmental Science, Corrosion Science, Bioelectrochemistry, Applied Energy, Chemical Society Reviews, International Journal of Hydrogen Energy, RSC Analyst, International Journal of Green Energy, Langmuir, Chemical Reviews, Journal of Visualized Experiments.

ORGANIZATION OF SCIENTIFIC EVENTS

Institution	Country	Period	Nature of activities
67 th Annual Meeting of the International Society of Electrochemistry	NL	2014-2016	<ul style="list-style-type: none">• Symposium Coordinator: Current progress in microbial electrochemical technologies
2 nd European Meeting of the International Society of Microbial Electrochemistry and Technology	ES	2014	<ul style="list-style-type: none">• Member of the scientific committee
64 th Annual Meeting of the International Society of Electrochemistry	MX	2012-2013	<ul style="list-style-type: none">• Organizing committee for Symposium 2: Sensing in Living Systems• Chairperson on diverse sections related to microbial electrocatalysis• Tutorial lecturer
3 rd International Biotechnology Meeting, UPIBI	MX	2002	<ul style="list-style-type: none">• Member of the general organizing committee

GUIDANCE OF STUDENTS

IN COURSE

1. **Post-doc.** Title: Electrochemically-enhanced synthesis of ionic liquids. Researcher: Dr. Sunita Rajamani. Flemish Institute for Technological Research (VITO). Co-promoter: Dr. Yolanda Alvarez-Gallego. (→Nov 2015)
2. **PhD.** Title: Evaluation of a sediment microbial fuel cell stack for energy recovery. Student: M.S. Nancy Karina Gonzalez Gamboa. Center of Scientific Research of Yucatan (CICY) - Flemish Institute for Technological Research (VITO). University promoter: Liliana Alzate Gaviria. (→Aug 2019)

3. **PhD.** Title: Implementation of a sediment microbial fuel cell for the recovery of elements of commercial interest. Student: M.S. Muriel Elisa Gonzalez Munoz. Center of Scientific Research of Yucatan (CICY) - Flemish Institute for Technological Research (VITO). University promoter: Liliana Alzate Gaviria. (→Aug 2019)
4. **PhD.** Title: Engineering of a bioelectrochemical system for metal recovery from aqueous matrices. Student: M.S. Diego de la Merced Jimenez. Universidad Nacional Autonoma de Mexico (UNAM) - Flemish Institute for Technological Research (VITO). University promoter: Sebastian Josep Pathiyamattom. (→Aug 2017)
5. **PhD.** Title: Bioelectrochemical systems for sustainable bio-chemical production and extraction. Student: M.S. Andersen Stephen. Gent University - Flemish Institute for Technological Research (VITO). University promoter: Korneel Rabaey.(→Aug 2016)
6. **PhD.** Title: Microbial electrosynthesis for chemical production in a bioelectrochemical system. Student: M.S. Bajracharya Suman. Wageningen University - Flemish Institute for Technological Research (VITO). University promoters: Anemiek Ter Heijne, David Strik. Main promoter: Deepak Pant. (→Aug 2016)
7. **Master.** Title: Determination of best applied potential, pH and inoculum concentration for an H-type microbial electrolysis cell inoculated with activated sludge. Student: Ariadna Segundo Aguilar. CIDETEQ, Mexico. Promoter: Bibiana Cercado Quezada.(→Dec 2015)

CONCLUDED

1. **Post-doc (2015)** Title: BioElectrochemical system for enzyme catalyzed CO₂ sequestration for the recovery of commercially viable carbonated water and methanol. Researcher: Dr. Sandipam Srikanth. Incoming International Fellowships (IIF), Marie Curie Actions. Co-promoters: Deepak Pant, Karolien Vanbroekhoven.
2. **Master (2015)** M.S. Katrijn Gijbels. Dissertation: Gas diffusion electrocrystallization: boron and lanthanum. KU-Leuven - Flemish Institute for Technological Research (VITO). University promoter: Dirk De Roose.
3. **Master (2014)** M.S. Chayambuka Kudakwashe. Dissertation: Capacitive ion removal: revisiting the theory and operation in view to develop the foundations of a novel process for sustainable recovery of critical metals. University of Toulouse III - Paul Sabatier - Flemish Institute for Technological Research (VITO). University promoter: Theo Tzedakis.
4. **Master (2013)** M.S. Nabin Aryal. Dissertation: Electrocatalytic production of hydrogen peroxide using oxygen-reducing gas-diffusion electrodes. MS - Environmental Technology and Engineering, Erasmus Mundus Master Course IMETE, UGENT, UNESCO-IHE, ICT-Prague, - Flemish Institute for Technological Research (VITO). University promoter: Korneel Rabaey. Co-promoter: Deepak Pant.
5. **Master (2012)** M.S. Ekin Emine Dalak. Dissertation: Evaluation of unified numerical and experimental methods for improving microbial electrochemical technologies. Master Pro - Process Engineering, Sp. Electrochemical Processes, University of Toulouse III - Paul Sabatier - Flemish Institute for Technological Research (VITO). University promoter: Theo Tzedakis.
6. **Master (2010)** M.S. Rafael Lopez Barrios. Dissertation: Bioconversion of solid residues for energy generation (methane and electricity) through anaerobic biodigestors and microbial fuel cells. UPIBI, National Polytechnic Institute, Mexico. Co-direction: Claudio Garibay Orijel et al.
7. **Master (2010)** M.S. Ricardo Ávila Lavalle. Dissertation: Evaluation of electrochemical impedancimetry as a method for real time quantification of lovastatin production by submerged fermentation of rice with *Monascus purpureus*, CINVESTAV, Merida, Mexico. Co-direction: Dra. Rossana Rodríguez.
8. **Master (2009)** M.S. Ivan Rosas Hernandez. Dissertation: Identification and Characterization of Microorganisms Resistant to Mercurial Compounds. CIEMAD, National Polytechnic Institute, Mexico. Co-directrice: Dr. Erika Quintana Cano (ENCB-IPN).

9. **BS (2012)** Q.I. Adriana Isabel Chable Cortez. Dissertation: Purification of statin drugs by rice fermentation with *Monascus purpureus*. Chemical Engineering Faculty, Autonomous University of Yucatan. Co-direction: Dr. David Muñoz. **Awarded as best thesis of the generation.**
10. **BS (2012)** I.Q. Rutely C. Burgos Castillo. Dissertation: New anodic materials for economic and high-power-density microbial fuel cells. Chemical Engineering Faculty, Autonomous University of Yucatan. Co-direction: Dr. Jose Manuel Dominguez Esquivel (IMP), Dr. Cristian Carrera Figueiras (UADY).
11. **BS (2010)** I.Q.I. Blanca Estela Torres Bautista. Dissertation: Application of electrochemical impedancimetry in the bioremediation of mercurial compounds. Chemical Engineering Faculty, Autonomous University of Yucatan. Co-direction: Dr. Rafael Rojas Herrera (FIQ-UADY), MC Pablo Acereto (UADY).
12. **BS (2007)** I.Bt. Dalinda Ramírez Espinosa. Dissertation: Bioelectrochemistry of biofilms and their influence in metallic materials. UPIBI, National Polytechnic Institute, Mexico. Co-direction: Dr. Gloria Lopez Jimenez (UPIBI-IPN).

DISTINCTIONS, PRIZES AND AWARDS

	Description	Periode/Period
1	R&D Coordinator of the Global Network of Mexican Talents (Talentos Mexicanos en el Exterior). Chapter Belgium.	2015-2018
2	National System of Researchers (Mexico) – Level 1 (2013). Maximal distinction to the quality and prestige of scientific research for Mexicans.	2016-2019
3	Member of the Global Network of Mexican Talents (Talentos Mexicanos en el Exterior). Area: Science and Technology. (Federal Government Initiative)	2013-present
4	Qualification aux fonctions de maître de conférences (France, approval for academic endeavors in French Universities)	2012-2015
5	National System of Researchers (Mexico) – Level 1 (2013). Maximal distinction to the quality and prestige of scientific research for Mexicans.	2013-2015
6	National System of Researchers (Mexico) – Level Candidate (2009). Maximal distinction to the quality and prestige of scientific research for Mexicans.	2009-2012
7	Innovation Laureate INP Toulouse, for the patent “Process for the electrochemical reduction of CO ₂ catalyzed by a biofilm” (2012)	2012
8	2 nd National Santander Prize for Innovation – Social impact category, Santander Bank (2010). Economic reward : 11k€	2010
9	Honorific mention to Doctoral Thesis by the Mexican Society of Electrochemistry, for the quality of doctoral research (2008).	2008

LONG STAYS ABROAD

My stays abroad can be regarded from two different perspectives. Mexico is my native country, thus from this perspective I have performed long stays in The Netherlands, France and Belgium. However, in Belgium I currently hold a permanent position and I plan to stay in this country. From the latter perspective, and in relationship to the present position, Mexico, The Netherlands and France can be considered as long stays abroad.

Institution	Country	Period	Nature of activities
VITO – Flemish Institute for Technological Research	BE	01/09/2011 to present	Research on (bio)electrochemistry
ENSIACET, National Polytechnic Institute of Toulouse	FR	01/07/2010 to 31/08/2011	Research on microbial electrolysis cells
Autonomous University of Yucatan	MX	07/01/2008 to 31/05/2010	Research on microbial electrochemical systems: microbial fuel cells, biocorrosion

Delft University of Technology (TU Delft)	NL	01/10/2006 to 31/10/2006	Course on microbial biofilms Current distribution modelling in microbial biofilms with transmission line analysis
Mexican Petroleum Institute	MX	01/09/2002 to 31/12/2007	Research on biocorrosion in various environments of petroleum industry

Teaching experience

A mind when stretched by a new idea never regains its original dimensions.

— Anonymous

DIDACTIC SKILLS

In 2009, in Mexico, I received the “**PROMEP Profile distinction**” by the National Professorship Improvement Program (PROMEP), which accredits the quality of University Professors for their **outstanding performance in the preparation of advanced education professionals** (BS, Master and PhD scholars) with high sense of responsibility, ethics, high quality and competitiveness.

In 2012, in France, I received the **qualification to the functions of “Maître de Conférences”** (roughly equivalent to a distinction to execute associate professor functions), **by opposition through the National Council of Universities** on the basis of proving published original research, relevant teaching and academic management duties.

In addition to these distinctions, I can summarize **my most relevant didactic skills** as follows:

- **Effective communicator** (explanation of theory, guidance of exercises and projects, academic discussions); comfortable conveying simple and complex theoretical and practical skills in a clear manner.
- **Supportive of project-based learning** (engaged with holistic transfer of learning to new situations/problems, use of knowledge more efficiently in performance situations) and small-group learning (productive cooperative learning).
- **Proficient planner of effective learning goals and situations**, for groups and individuals.
- **Sensitive to different learning styles and abilities.**
- **Respectful of diversity** in international and multi-cultural environments.
- **Effective to motivate and engage students in active learning.**
- **Efficient in the use of ICT** in the academic processes.
- **Skilful to provide constructive feedback** to students and subordinates on performance.
- **Competitive in microteaching methods**, for scrutiny of self-teaching performance “under the microscope”, as a way to improve and acquire new teaching skills, and to simplify complexities of teaching subjects.
- **Experienced on the development of teaching portfolios and syllabi**

TEACHING STATEMENT

Electrochemistry embraces the study of some of the key phenomena that have allowed mankind to develop many vibrant technologies and it is definitely supporting our continuation towards new thrilling developments, especially in the outlook of a sustainable society in all its dimensions. In fact, **Electrochemistry is today undergoing a renaissance.** The thriving computational infrastructure and skills have transformed the field to previously unreachable levels of accuracy, precision and efficiency, supported by new and more comprehensive theories and models. It is undeniably a strategic science to obtain sustainable and renewable resources, clean energy technologies and diagnostic platforms. **It provides the only cost-effective way to obtain certain critical materials**, e.g. there are no alternative technologies for most elements obtained by electrowinning, such as aluminum, fluorine, and caustic soda. Electrochemical devices and processes represent a major market force worldwide. Only for the USA the annual electrochemical market was >€60 billion

(excluding corrosion), even before the commercial booming of Li-ion batteries and miniaturized sensing devices since the 1990s. Electrochemistry also allows us to **understand the degradation of metals and ways to overcome it, thus enabling the stability and recyclability of myriads of daily used materials**. Environmental electrochemistry already contributes to pollution detection, remediation of polluted natural resources and environments, recycling of metals, and alternative sources of energy.

Despite its scientific, technologic and economic relevance, Electrochemistry is still undervalued in most academic programs. Teaching fundamental Electrochemistry and electrochemical engineering is a matter of giving the contemporary and future generations of students the essential grounds to further develop this area. In order to stimulate the initial curiosity, there is no substitute to preaching with example. Thus, a **research ground on electrochemical science and engineering needs to be strengthened at the KU Leuven**, where more groundbreaking electrochemical discoveries and inventions are available at a glance. Of course, knowledge needs to be shared to be far more valuable and, among other strategies, teaching is effective for this purpose. **I would strengthen the content related to Electrochemistry and Corrosion of existing syllabi** at the Faculty, with focus on the recovery of critical resources like metals and metalloids, sustainable exploitation of natural and secondary resources and on sustainable materials processing. **I would develop a new course on electrochemical engineering that can strengthen multidisciplinary education and add value to existing curricula.** Critical thinking is the most practical aspect to build the intellectual skills of the new generation of professionals that will reveal and engineer electrochemical breakthroughs. **I certainly meet the electrochemical engineer profile required to materialize these duties, plus I have the motivation and skill it takes.**

TEACHING EXPERIENCE

Institution	Start and end date	Number of hours per week	Subject, course title
Flemish Institute for Technological Research (VITO)	03/09/2012 to 07/09/2012	10	Electrochemical methods I
	06/10/2014 to 17/10/2014	10	Electrochemical methods II
Autonomous University of Yucatan (UADY)	15/01/2008 to 15/06/2008	3	Scientific Research and Technological Development
	15/01/2008 to 15/06/2008	2	Industrial fermentations
	07/07/2008 to 11/07/2008	24	Biofilms and biocorrosion
	15/08/2008 to 15/12/2008	3.5	Corrosion
	15/01/2009 to 15/06/2009	2	Industrial fermentations
	07/10/2009 to 09/10/2009	16	Fermentations workshop
	07/10/2009 to 09/10/2009	12	Workshop: microbial fuel cells
	15/08/2009 to 15/12/2009	1.5	Introduction to Biotechnology
	15/08/2009 to 15/12/2009	3.5	Corrosion
15/01/2010 to 15/06/2010	2	Industrial fermentations	
Center of Scientific Research of Yucatan (CICY)	13/04/2009 to 18/04/2009	10.5	Biotechnology (Master)
National Autonomous University of Mexico (UNAM)	01/08/2004 to 31/05/2005	1.5	Advanced methods in Electrochemistry (Master)
	01/08/2004 to 31/05/2005	1.5	Electronics for Electrochemistry (Master)
National Polytechnic Institute (UPIBI)	01/11/2003 to 31/07/2004	3.5	Plant and animal cell cultures

PROFESSIONALIZATION OF EDUCATION

Program	Title of degree	Grade obtained	University	Year
BA	Education development (orientation: advanced education scientific/engineering programs)	Incomplete	University of Guadalajara (Mexico) – <i>E-learning</i>	Incomplete 2010-2012
Teacher training	Tutoring (theoretical basis, basic abilities, strategies and tools for promoting self-learning)	Diploma	University of Yucatan (Mexico)	2009

Service to the profession

RESEARCH SERVICES

Accredited proposal/project evaluator:

- National Science Council CONACyT, Mexico.
- Horizon 2020. NMP calls. ID EX2013D135094; European Commission.

ACADEMIC SERVICES

- Member of the core coordinating team of graduates for the evaluation of the new program of studies (2014) for the National Polytechnic Institute (Mexico) for bioprocess engineering degrees.UPIBI-IPN, Mexico.
- Coordinator of the proposal for a new program on BS Biotechnology Engineering (2008-2010), later on approved and implemented (2011). Autonomous University of Yucatan, Mexico.
- I actively participate with lectures to the academic community at different universities, upon request. For instance, in 2012 I offered a training lecture on electrochemical impedance spectroscopy to PhD students of LabMET. On 03/Apr/2015 I will offer a lecture on the seminar series "The paradigm shift towards resource recovery' concerning 'Recovery of valuable metals from aqueous waste streams'.

SOCIAL SERVICES

- **2015-2018** R&D Coordinator Global Network of Mexican Talents, Chapter Belgium (Mexican Federal Government Initiative). Volunteering work in liaison with the Mexican Embassy in Belgium to promote scientific excellence of Mexicans in Belgium.
- **2015-2021** EmTechHub Advisor. Volunteering work to promote, educate and guide young future innovators, below 16.

Referrals

Name	Prof. Digby Macdonald
Title/appointment	Professor in Residence, Departments of Nuclear Engineering and Materials Science and Engineering, University of California at Berkeley. Visiting Chair Professor, Center of Research Excellence in Corrosion, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. Distinguished Professor Emeritus of Materials Science and Engineering, Penn State University Nominated for the Nobel Prize in Chemistry, 2011.
Institution	University of California, Berkeley Pennsylvania State University
Address	316 Hearst Memorial Mining Building, UC Berkeley, Berkeley, CA 94720
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Fax	+1 510 642 0000
E-mail	macdonald@Berkeley.EDU; digby.macdonald@gmail.com

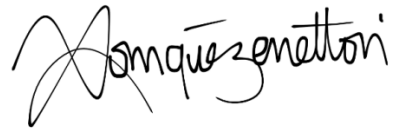
Name	Dr. Bernard Tribollet
Title/appointment	Research Director
Institution	UPR15 du CNRS, LISE, Laboratoire Interfaces et Systèmes Electrochimiques, Univ. Pierre et Marie Curie
Address	4 place Jussieu, case courrier 133, 75252 PARIS CEDEX 05, France
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Name	Prof. Homero Castaneda
Title/appointment	Associate professor - Texas A&M University Director - National Corrosion Center, USA
Institution	Texas A&M University / National Corrosion Center, USA
Address	01 Joe Routh Blvd, College Station, TX 77843, United States
Phone	+1 979 458 98 44
E-mail	hcastaneda@tamu.edu

Name	Prof. Korneel Rabaey
Title/appointment	Professor (full)
Institution	Ghent University (UGent), Laboratory of Microbial Ecology and Technology, Faculty of Bioscience Engineering
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Fax	+32 9 264 6248
E-mail	Korneel.Rabaey@UGent.be

I confirm that the above information, and the attached academic cv, have been honestly and conscientiously completed and give permission to investigate their truthfulness.

September 28th, 2015.

A handwritten signature in black ink that reads "Xochitl Dominguez Benetton". The signature is fluid and cursive, with the first name "Xochitl" being particularly prominent.

Xochitl Dominguez Benetton

Scientist

(Bio)Electrochemical Technology

VITO