

Henry Andres CORTÉS PÁEZ

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📍 Alameda de Mazarredo, 14, E-48009 Bilbao, Basque Country - Spain.

📅 Date and Place of birth : March 27, 1989 - Armenia (Quindío), Colombia



During my Ph.D. (2015-2020), I was member of the ESESCG group at the National Atomic Energy Commission (CNEA), working under the supervision of Prof. Horacio Corti and Dr. Veronica Vildosola. My Ph.D. research focused on the use of ab initio calculations, electrochemical techniques and scanning probe microscopy to study materials for Li-oxygen batteries.

In March 2020, I joined the MSCM group of Dr. Damian Scherlis at University of Buenos Aires. There, I investigated the partitioning phenomenon of alcohol-water within nanopores using molecular dynamics.

Very recently, I joined the MSLMS group of Prof. Elena Akhmatkaya at the Basque Center for Applied Mathematics (BCAM), where I am working in the development of solid state electrolytes suitable for Li-ion batteries.

🔧 RESEARCH INTERESTS

- > Materials for renewable energy applications.
- > Atomistic simulations.
- > Electrochemical techniques.
- > Scanning probe microscopes.

🎓 EDUCATION

March 2020 April 2015	Ph.D. degree in Science and Technology : Physics. NATIONAL UNIVERSITY OF SAN MARTÍN, Argentina. Dissertation title : Study of formation and charge transport of Li_2O_2 in relation with the Li-oxygen battery. Advisors : PhD. Verónica Vildosola and Prof. Horacio R. Corti. Workplace : National Atomic Energy Commission (CAC-CNEA). Doctoral courses : <ul style="list-style-type: none">> Electronic structure of materials : calculation techniques from first principles.> Fundamentals and applications of transport processes.> Electrochemical systems of energy storage and conversion.> Nanomaterials and micro devices : synthesis, manufacture and characterization of systems.> Basic concepts of neutron scattering.> Calculation of magnetic properties from the density functional theory.
July 2012 February 2006	B.Sc. Physics, UNIVERSITY OF QUINDÍO Colombia. Dissertation title : Study and in vivo measurement of dielectric characteristics by complex impedance spectroscopy in fruits of yellow Pitahaya. Advisors : PhD. Jose Castillo and MSc. Rocío S. Suárez.

🏆 AWARDS

- > Laureate dissertation, B.Sc. in Physics, University of Quindío 2012.
- > Best Poster Award, International Centre for Theoretical Physics-ICTP Caribbean School on Materials for Clean Energy, Cartagena, 2019.
- > Honor Mention, Ph. D. dissertation, National University of San Martín, 2020.

⚙️ RESEARCH EXPERIENCE

Present October 2021	Research technician. Basque Center for Applied Mathematics BCAM, Bilbao, Basque Country - Spain. Topic : Solid-state electrolytes for Li-ion batteries.
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October 2021 April 2020	Postdoctoral Scholarship. Postgraduate fellowship granted by National Scientific and Technical Research Council (CONICET) in Argentina. Topic : Partition and segregation of aqueous solutions in nanometric pores.
March 2020 April 2015	Doctoral Scholarship. Postgraduate fellowship granted by National Scientific and Technical Research Council (CONICET) in Argentina. Topic : Materials for Li-oxygen batteries.
November 2018 September 2018	Postgraduate research stay at the international center for theoretical physics (ICTP), ITALY. Topic : Studying of the Li_2O_2 nucleation mechanisms on CeO_2 catalysts for Li-oxygen batteries. Supervisor : PhD. Nicola Seriani.
February 2014 March 2013	Young researcher. University of Quindío, Administrative Department of Science, Technology and Innovation (COLCIENCIAS) in Colombia. Topic : Development of a device to follow the microbial growth using impedance spectroscopy measurements. Supervisor : MSc. Rocío S. Suárez.

TEACHING EXPERIENCE

December 2014 March 2014	High school teacher. María Inmaculada high school. Teacher of physics and math.
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SKILLS

Software : \LaTeX , Office, Nanoscope, Gwyddion, NOVA, vim, xmgrace, p4vasp, potfit, vmd and VESTA.

Quantum and molecular dynamics simulations : VASP, Quantum Espresso and LAMMPS.

Programming language : Bash (medium), FORTRAN (medium) and Python (medium).

Experimental : Atomic force microscope, Scanning tunneling microscope, several electrochemical techniques, rotating ring-disk electrode, glove Box use and maintenance.

LANGUES

Spanish ● ● ● ● ●
English ● ● ● ● ○

PUBLICATIONS

- > **Cortes Henry A.**, Zapata Jhon F., Barral María A. and Vildosola Verónica L. Understanding the effect of doping on the charging performance of the Li-O₂ battery : the role of hole polarons and lithium vacancies. Accepted on Journal of physical chemistry C. Temporal doi:10.1021/acs.jpcc.1c05313.
- > **Cortes Henry A.** and Corti Horacio R. In-situ characterization of discharge products of lithium-oxygen battery using Flow Electrochemical Atomic Force Microscopy. Acepcted on Ultramicroscopy doi:10.1016/j.ultramic.2021.113369.
- > **Cortes Henry A.**, Barral María Andre, Seriani Nicola, Corti Horacio R. and Vildosola Verónica L. Revealing the Li₂O₂ Nucleation Mechanisms on CeO₂ Catalysts for Lithium-Oxygen Batteries. ChemCatChem., 20, 4132 (2020).doi:10.1002/cctc.202000013.
- > **Cortes Henry A.**, Vildosola Verónica L., Barral María Andrea and Corti Horacio R.,Effect of halogen dopants on the properties of Li₂O₂ : is chloride special?. Phys. Chem. Chem. Phys., 20, 16924 (2018).doi:10.1039/C8CP01211C.
- > Corti Horacio R. and **Cortes Henry A.**. On the oxygen transport in cathodes of Li-air batteries Comment on “Out-of-cell oxygen diffusivity evaluation in lithium-air batteries”, ChemElectroChem 4, 450 (2017). doi:10.1002/celec.201600524.
- > **Cortes Henry A.**, Villegas Edgar A., Suárez Rocio, Castillo Jose, Gonçalves Luis M., Bueno Paulo R. Pitahaya Aging Diagnostic by Impedance/Capacitance Spectroscopy. Food Anal. Methods 8, 126 (2015). doi:10.1007/s12161-014-9878-7.

SOME CONFERENCE PRESENTATIONS

June 2019	<p>Towards an understanding of Li₂O₂ formation on CeO₂ catalysts in lithium-oxygen batteries. H. A. Cortes, M. A. Barral, N. Seriani, H. Corti and V. Vildosola. ICTP Caribbean School on Materials for Clean Energy. Cartagena, Colombia. Poster presentation.</p>
May 2018	<p>Study of the electronic properties of the Li₂O₂ surfaces. Original tittle : Estudio de las propiedades electrónicas de las superficies de Li₂O₂. H. A. Cortes, V. Vildosola , M. A. Barral and H. Corti. XVIII Encuentro de Superficies y Materiales Nanoestructurados. La Plata, Argentina. Poster presentation.</p>
September 2017	<p>Effect of halogen as dopants on Li₂O₂ properties : Why would chloride be special ? Original tittle : Efecto de los halógenos como dopantes en las propiedades del Li₂O₂:¿Por qué el Cloruro sería especial ? H. A. Cortes, V. Vildosola , M. A. Barral and H. Corti. 102 Reunión de la Asociación Física Argentina. La Plata, Argentina. Oral presentation.</p>
September 2017	<p>Effect of halogen dopants on Li₂O₂ properties : Why would chloride be special ? H. A. Cortes, V. Vildosola , M. A. Barral and H. Corti. XVI Brazil MRS meeting. Gramado, Brasil. Poster presentation.</p>
June 2017	<p>Transport of Li⁺ and O₂ in glymes in relation to lithium-air batteries. H. R. Corti, G. Horwitz, M. Factorovich, H. A. Cortés Páez and M.P. Longinotti. 6th Symposium on Hydrogen, Fuel Cells and Advanced Batteries, Porto, Portugal. Invited speaker Horacio R. Corti.</p>
March 2017	<p>An ab-initio calculation of the effect of halogens dopants on the Li₂O₂ properties. H. A. Cortes, V. Vildosola , M. A. Barral and H. Corti. 20th topical meeting of the International Society of Electrochemistry. Buenos Aires, Argentina. Poster presentation.</p>

November 2016

Prediction of oxygen diffusivity in organic solvents of interest for lithium-air batteries | Study of the effect of halogens on the properties of Li_2O_2 .

H. A. Cortes, V. Vildosola, M. A. Barral and H. Corti.

3rd International Workshop on Lithium, Industrial Minerals and Energy. Jujuy, Argentina.

Poster presentation.

“ REFERENCES

Prof. Horacio R. Corti

Senior researcher, CONICET

✉ hrcorti@tandar.cnea.gov.ar

Dr. Verónica Vildosola

Independent researcher, CONICET

✉ vildosol@tandar.cnea.gov.ar

Dr. Damian Scherlis

Independent researcher, CONICET

✉ damian@qi.fcen.uba.ar