

Erika J. Espinosa-Ortiz

Water & Environmental Technologies Researcher

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Education

Ph.D., Environmental Technologies for Contaminated Solids, Soils and Sediments Erasmus Mundus Joint Doctorate Program / 2012-2015

UNESCO-IHE (The Netherlands), Paris-Est (France), University of Cassino (Italy)

Research: Bioreduction of selenite and tellurite by *Phanerochaete chrysosporium*: applications in wastewater treatment. *Advisors:* Prof. Piet N. Lens, Prof. Eric van Hullebusch.

M. Sc., Ecological Sciences and Engineering / 2008-2010

Purdue University (USA)

Research: Ecotoxicological assessment of gallium and indium on soil microbial activity, seed germination and root growth. *Advisor:* Prof. Ronald Turco.

M. Sc., Environmental Engineering / 2007-2009

National Autonomous University of Mexico (Mexico)

Research: Biological contamination of source water supplies in Tula Valley, Hgo. Mex.

Advisor: Prof. Blanca E. Jimenez-Cisneros

B. Eng., Environmental Engineering / 2002-2006

Autonomous Metropolitan University (Mexico)

Research: Biodegradation of hydrocarbons in soil by bioaugmentation. *Advisor:* Prof. Mabel Vaca-Mier.

Professional appointments

Assistant Research Professor / Oct 2018 – To date

Department of Chemical and Biological Engineering

Center for Biofilm Engineering, Montana State University (USA)

Main activities: continuation of postdoctoral work, research projects to investigate biomineralization processes, multi-kingdom biofilms (algae-fungi-bacteria), biodeterioration of building materials, development of biofilm technologies for the treatment of diverse pollutants in wastewater.

Postdoctoral Research Associate / 2016 – Sept 2018

Center for Biofilm Engineering, Montana State University (USA)

Main activities: research projects to investigate biomineralization processes and the formation of single and mixed bacterial, fungal and algal biofilms in a variety of model systems, simulating medical, environmental and industrial situations.

Environmental consultant, analyst and laboratory assistant / 2006–2007

Water quality and residues laboratory, Autonomous Metropolitan University (Mexico)

Main activities: microbiological and physicochemical analysis of water and soil samples; environmental toxicology and risk assessment; sustainable process design and optimization.

Research and teaching assistant / 2005-2006

Autonomous Metropolitan University (Mexico)

Main activities: preparation of lecture materials; grading quizzes and assignments; co-organization of workshops and conferences.

Teaching experience

Guest lecturer

- Taught a section of the course ARCH 331, On-site treatment of domestic wastewater, Montana State University, USA, Fall 2017 & 2018
- Taught a section of the course EENV 340, Coagulation and flocculation processes. Montana State University, USA, Fall 2018
- Taught a section of the course EENV 340, Fixed-biofilms for wastewater treatment, Montana State University, USA, Fall 2016

Teaching assistant - Taught laboratory sections for undergraduates, 1136009 Processes of Wastewater Treatment, and 1136011 Integrated Solid Waste Management, Autonomous Metropolitan University, Mexico, Fall 2005 - Spring 2006

Publications

- A.C. Mitchell, **E.J. Espinosa-Ortiz**, S.L. Parks, A. Phillips, E. Lauchnor, A.B. Cunningham, R. Gerlach (2019) Kinetics of calcite precipitation by ureolytic bacteria under aerobic and anaerobic conditions. *Biogeosciences*, 16:2147-2161.
- **E.J. Espinosa-Ortiz**, R. Gerlach (2019) Struvite stone formation by ureolytic biofilm infections (Chapter 6). In: *The Role of Bacteria in Urology*, 2nd edition, D. Lange, B. Chew (Eds): Springer. (In Press).
- **E.J. Espinosa-Ortiz**, B.H. Eisner, D. Lange, R. Gerlach (2018) Current insights into mechanisms and management of infection stones. *Nat Rev Urol*, 16(1):35-53.
- L.C. Tan, **E.J. Espinosa-Ortiz**, V.N. Yarlagaadda, E.D. van Hullebusch, R. Gerlach, P.N.L. Lens. (2018) Selenate removal in biofilm systems: effect of nitrate and sulfate on selenium removal efficiency, biofilm structure and microbial community. *J Chem Technol Biotechnol*, 93(8):2380-2389.
- **E.J. Espinosa-Ortiz**, E.R. Rene, F. Guyot, E.D. van Hullebusch, P.N.L. Lens (2017) Biomineralization of tellurium and selenium-tellurium nanoparticles by the white-rot fungus *Phanerochaete chrysosporium*. *Int Biodeterior Biodegradation*, 124:258-266.
- **E.J. Espinosa-Ortiz**, M. Shakya, R. Jain, E.R. Rene, E.D. van Hullebusch, P.N.L. Lens (2016) Sorption of zinc onto elemental selenium nanoparticles immobilized in *Phanerochaete chrysosporium* pellets. *Environ Sci Pollut Res*, 23(21):21619-21630.
- **E.J. Espinosa-Ortiz**, Y. Pechaud, E. Lauchnor, E.R. Rene, R. Gerlach, B.M. Peyton, E.D. van Hullebusch, P.N.L. Lens (2016) Effect of selenite on the morphology and respiratory activity of *Phanerochaete chrysosporium* biofilms. *Bioresour Technol*, 210:138-145.
- **E.J. Espinosa-Ortiz**, E.R. Rene, K. Pakshirajan, E.D. van Hullebusch, P.N.L. Lens (2016) Fungal pelleted reactors in wastewater treatment: applications and perspectives. *Chem Eng J*, 283:553-571.
- **E.J. Espinosa-Ortiz**, E.R. Rene, E.D. van Hullebusch, P.N.L. Lens (2015) Removal of selenite from wastewater in a *Phanerochaete chrysosporium* pellet based fungal bioreactor. *Int Biodeterior Biodegradation*, 102:361-369.
- **E.J. Espinosa-Ortiz**, G. Gonzalez-Gil, P.E. Saikaly, E.D. van Hullebusch, P.N.L. Lens. (2015) Effects of selenium oxyanions on the white-rot fungus *Phanerochaete chrysosporium*. *Appl Microbiol Biotechnol*, 99(5):2405-18.
- **E.J. Espinosa-Ortiz**, M. Vaca-Mier. (2013) Nanotechnology for water and wastewater treatment: potentials and limitations. In: P.N.L. Lens, J. Virkutyte, V. Jegatheesan, S.H. Kim, S. Al-Abed (Eds.), *Nanotechnology for Water and Wastewater Treatment*. IWA Publishing. pp. 83-127.

Conferences

- *Microbial defacement of building materials*. Oral presentation. Montana Biofilm Meeting, USA, 2018.
- *Evaluating the role of urine chemistry on the formation of infection stones*. Poster presentation. World Congress of Endourology, Canada, 2017.
- *Understanding the development of mixed fungal-bacterial biofilms*. Oral presentation. Montana Biofilm Meeting, USA, 2017.
- *Effect of selenite on the morphology and respiratory activity of Phanerochaete chrysosporium biofilms*. Oral presentation. Montana Biofilm Meeting, USA, 2016.
- *Effect of selenite on fungal biofilms*. Oral presentation. 4rd International Conference on Research Frontiers in Chalcogen Cycle Science and Technology, The Netherlands, 2015.
- *Exploiting the operational advantages of Phanerochaete chrysosporium inoculated suspended growth bioreactor for the removal of selenite from wastewater*. Oral presentation. 2nd International Conference on Recycling and Reuse, Turkey, 2014.
- *Comparative study of three processes of biological degradation of hydrocarbons in contaminated soil*. Oral presentation. XXI Week of teaching and research in chemistry. Autonomous Metropolitan University, Mexico, 2008.
- *Application of biotechnology to contaminated soils by diesel*. Oral presentation. 8th Environmental Engineering Forum and the 7th Environmental Week. Autonomous Metropolitan University, Mexico, 2007.
- *Application of compost to contaminated soils by diesel for their remediation*. Oral presentation. XV National Congress: Environmental Solutions for a Plenty Development. Mexico 2025. Mexican Federation of Sanitary Engineering and Environmental Sciences, Mexico, 2006.

Honors and awards

- First place in Flash Presentation competition. 4rd International Conference on Research Frontiers in Chalcogen Cycle Science and Technology, Delft, The Netherlands, 27th-28th May 2015.
- First place in the Poster competition. 3rd International Conference on Research Frontiers in Chalcogen Cycle Science and Technology, Delft, The Netherlands, 27th-28th May 2013.
- Award for Student Excellence. National Association of Engineering Faculties and Schools. Mexico, 2007.
- Academic Excellence Award, Autonomous Metropolitan University, Mexico, 2002-2005.
- Mexican representative at the Stockholm Junior Water Prize, International Water Week, Sweden, 2001.
- National Junior Water Prize, *Alternate drainage for the treatment and reuse of water*, Mexico, 2001.

Peer review

Montana NASA EPSCoR Panel reviewer, Research initiation proposals, 2018; 2019.

Associate editor, *Annals of Microbiology*, Jan 2017- April 2019.

Reviewer, *AMB Express*, *Algal Research*, *RSC Advances*, *Journal of Hazardous Materials*, *Environmental Science and Pollution Research*, *The Science of the Total Environment*, *Applied Microbiology and Biotechnology*, *Journal of Environmental Engineering*, *Internatiional Journal of Environmental Research and Public Health*.

Research support

- “Mineral recovery from urine- an alternative approach for providing nutrients for primary production in a controlled ecological life support system for long-term space missions”. Montana NASA EPSCoR Research Infrastructure Development (RID) RY. \$40,435. 01/18 – 09/18. Co-Principal Investigator.
- “Linking engineering and urology towards a better understanding and improved treatment of urinary stones”. Burroughs Wellcome Fund – Collaborative Research Travel Grant (ID# 1017519). \$10,667. 07/17 – 07/18. Co-Principal Investigator.
- Erasmus Mundus Grant. Erasmus Mundus Joint Doctorate Program. 2012-2015. Environmental Technologies for Contaminated Solids, Soils and Sediments (ETECoS3). Education, Audiovisual and Culture Executive Agency. European Commission. €108,300 (€7,500 for travel and installation expenses, €2,800 per month for living expenses).
- Vanguardia Latina Forum. 2009. Travel Grant. Inter-American Development Bank, Televisa of Mexico, The Getty Museum and the Los Angeles Mayor’s Office.
- Fulbright Grant. Fulbright Foreign Student Program. 2008-2010. Grant for M.Sc. study in Ecological Sciences and Engineering at the Purdue University – Graduate School. \$15,000 per year for living expenses, \$21,510 per year for tuition fees.

Additional skills

Mentoring and training

B.Sc., M.Sc. and Ph.D. students

- Camryn DuBois, B.Sc. Mechanical Engineering, Montana State University, Spring 2019.
- Bengisu Kilic, B.Sc. Bioengineering, Montana State University, Summer 2018.
- Sobia Anjum, Ph.D Civil & Environmental Engineering, Montana State University, Summer 2018.
- David Steinberg, B.Sc. Chemical Engineering, Montana State University, Summer 2018.
- Ayrat Ziganshin, Associate Professor, Visiting scholar at Montana State University, Summer 2018.
- Dalton Albers, M.Sc. Chemical & Biological Engineering, Montana State University, Fall 2017.
- Training users of Raman Spectroscopy and Confocal Raman Imaging, CBE. 2017-to date.
- Helin Alagoz, B.Sc. Bioengineering, Montana State University, 2016-2017.
- Lea C. Tan, Ph.D. Environmental Technologies. Visiting scholar at Montana State University, Spring 2016.
- Manisha Shakya, M.Sc. Water Quality Management. UNESCO-IHE, The Netherlands 2014-2015.

Non-technical competences

- Good organisational skills and time management as co-organizer of international symposiums, workshops and conferences.
- Multicultural experience through education and team related relationships.
- Open minded, positive attitude, adaptable to different situations and working environments.

Digital competence

Microsoft Office tools (Word, Excel, PowerPoint, Publisher); statistical software (R, Minitab); lifecycle analysis software (SimaPro, GREET); chemical equilibrium software (Visual MINTEQ); microscopy image analysis software (Imaris, Metamorph).

Use of specialized equipment

Graphite furnace atomic absorption spectroscopy (GFAAS), atomic absorption spectroscopy (AAS), confocal laser scanning microscopy (CLSM), elemental analyser, potentiometric titrator, thermogravimetric analyser (TGA), Raman confocal microscopy, Fourier-Transform Infrared spectroscopy (FT-IR), cryosection device and oxygen microelectrodes.