

HIRAM CASTILLO-MICHEL, Ph.D.

PLACE AND DATE OF BIRTH

Chihuahua, Chih., Mexico/ February 1st, 1979

PRESENT POSITION

Beamline Scientist
X-ray microscopy beamline ID21
European Synchrotron Radiation Facility
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Research interests: Application of synchrotron μ XRF/ μ XANES and μ FTIR for the study of the distribution and biochemical modification of trace elements and nanomaterials in biological samples. In particular, I am interested in the fate and transport of nanomaterials and potentially toxic elements in plants. Since plants are part of the first level in the food chain, they are a main route of entrance of toxic elements in the food chain. These toxic elements and nanomaterials are environmental stressors at the tissue and cellular level, disrupting important biochemical functions in living organisms. The specific localization and chemical form of these stressors at the tissue and subcellular level are the main objects of my research.

EDUCATION

European Synchrotron Radiation Facility

Post-doctoral fellow

Feb 2011 – Jul 2013

University of Texas at El Paso, El Paso, Texas

Ph.D., Environmental Science and Engineering

Graduation: May 2011

Dissertation: "Accumulation, speciation, and distribution of metal(loids) in plants: Applications of synchrotron techniques in environmental sciences"

University of Texas at El Paso (UTEP), El Paso, Texas

M.S., Analytical/Environmental Chemistry

Graduation: December 2005

Thesis: "Biochemical Aspects of Chromium and Arsenic Uptake by Peas (*Pisum sativum*): Effect on Amylase Activity and Elemental Reduction"

Universidad Autonoma de Chihuahua, Mexico

B.S., Chemical Engineering

Graduation: December 2002

FELLOWSHIPS

Advanced Light Source Doctoral Fellowship in residence

January 2010-2011

Awarded by Scientific Support Group of the ALS at the Lawrence Berkeley National Lab

Sistema Nacional de Investigadores Level I CVU 221197

2013-2020

National Council for Science and Technology (**CONACYT**) from the Mexican Federal Government

AWARDS

1. Outstanding Master of Science student with highest GPA. December 2005, El Paso, USA.
2. Outstanding Doctoral student in Environmental Science and Engineering. May 2011, El Paso, USA.

SELECTED PEER-REVIEWED PUBLICATIONS

- Pradas del Real, A.E., **Castillo-Michel, H.**, Kaegi, R., Larue, C., de Nolf, W., Reyes-Herrera, J., Tucoulou, R., Sarret G. (2018) Searching for relevant criteria to distinguish natural vs. anthropogenic TiO₂ nanoparticles in soils. *Environmental Science: Nano*, <http://dx.doi.org/10.1039/C8EN00386F>
- Schreiber, I., Hesse, B., Seim, C., **Castillo-Michel, H.**, Villanova, J., Laux, P., Dreiaek, N., Penning, R., Tucoulou, R., Cotte, M., Luch, A. (2017) Synchrotron-based nano-XRF mapping and μ -FTIR microscopy enable to look into the fate and effects of tattoo pigments in human skin. *Scientific Reports*, 7, 11395.
- Pradas del Real, A.E., Vidal, V., Carrière, M., **Castillo-Michel, H.**, Levard, C., Chaurand, P., Sarret, G. (2017) Silver nanoparticles and wheat roots: A complex interplay. *Environmental Science and Technology*, 51 (10), 5774–5782. DOI: 10.1021/acs.est.7b00422
- Servin, A.D., Pagano, L., **Castillo-Michel, H.**, De la Torre-Roche, R., Hawthorne, J., Hernandez-Viezcas, J.A., Loredó-Portales, R., Majumdar, S., Gardea-Torresdey, J.L., Dhankher, O.M., White, J.C. (2017) Weathering in soil increases nanoparticle CuO bioaccumulation within a terrestrial food chain. *Nanotoxicology*, 11(1), 98-111.
- Ferraro, D., Tredici, I.G., Ghigna, P., **Castillo-Michel, H.**, Falqui, A., Di Benedetto, C., Alberti, G., Ricci, V., Anselmi-Tamburini, U., Sommi, P. (2017) Dependence of the Ce(III)/Ce(IV) ratio on intracellular localization in ceria nanoparticles internalized by human cells. *Nanoscale*, 9, 1527-1538.
- Pradas del Real, A.E., **Castillo-Michel, H.**, Kaegi, R., Sinnet, B., Magnin, V., Nathaniel, F., Villanova, J., Carrière, M., Santaella, C., Fernandez-Martinez, A., Levard, C., Sarret, G. (2016) Fate of Ag-NPs in sewage sludge after application on agricultural soils. *Environmental Science and Technology*, 50, 1759-1768.
- **Castillo-Michel, H.**, Larue, C., Pradas del Real, A., Cotte, M., Sarret, G. (2016) Practical Review on the use of synchrotron based micro- and nano- X-ray fluorescence mapping and X-ray absorption spectroscopy to investigate the interactions between plants and engineered nanomaterials. *Plant physiology and biochemistry* (<http://dx.doi.org/10.1016/j.plaphy.2016.07.018>)
- Smulder, S., Larue, C., Sarret, G., **Castillo-Michel, H.**, Vanoirbeek, J., Hoet, P. (2015) Lung distribution, quantification, co-localization and speciation of silver nanoparticles after lung exposure in mice. *Toxicology letters*, 238, 1-6. DOI: 10.1016/j.toxlet.2015.07.001
- Roman, M., Rigo, C., **Castillo-Michel, H.**, Munivrana, I., Vindigni, V., Micetic, I., Benetti, F., Manodori, L., Cairns, W. (2015) Hydrodynamic chromatography coupled to single-particle ICP-MS for the simultaneous characterization of Ag NPs and determination of dissolved Ag in human plasma and blood burnt patients. *Analytical and bioanalytical Chemistry*, 408(19), 5109-5124.
- Larue, C., **Castillo-Michel, H.A.**, Sobanska, S., Trcera, N., Sorieul, S., Cecillon, L., Ouerdane, L., Legros, S., Sarret, G. (2014) Fate of pristine TiO₂ nanoparticles and aged paint-containing TiO₂ nanoparticles in lettuce crop after foliar exposure. *Journal of Hazardous Materials*, 273, 17-26.
- Larue, C., **Castillo-Michel, H.**, Sobanska, S., Cecillon, L., Bureau, S., Dumat, C., Barthes, V., Ouerdane, L., Carrière, M., Sarret, G. (2014) Foliar exposure of *Lactuca sativa* to silver nanoparticles: Evidence for internalization and changes in Ag speciation. *Journal of Hazardous Materials*, 264, 98-106.
- Servin, A., Morales, M.I., **Castillo-Michel, H.**, Hernandez-Viezcas, J.A., Muñoz, B., Zhao, L., Nunez, J.E., Peralta-Videa, J.R., Gardea-Torresdey, J.L. (2013). Synchrotron Verification of TiO₂ accumulation in cucumber fruit: A possible pathway of TiO₂ nanoparticle transfer from soil into the food chain. *Environmental Science and Technology*, 47(20), 11592-11598.
- Hernandez-Viezcas, J., **Castillo-Michel, H.**, Andrews, J., Cotte, M., Rico, C., Peralta-Videa, J., Priester, J., Holden, P., Gardea-Torresdey, J. (2013). Synchrotron X-ray Fluorescence Mapping and Speciation of CeO₂ and ZnO Nanoparticles in Soil Cultivated Soybean (*Glycine max*). *ACS Nano* 7(2), 1415-1423.
- Sarret, G., Pilon-Smits, E.A.H., **Castillo-Michel, H.**, Isaure, M.P., Zhao, F.J., Tappero, R. (2013). Use of Synchrotron-based techniques to elucidate metal uptake and metabolism in plants. *Advances in Agronomy* 119, Book Chapter 1.
- Servin, A., **Castillo-Michel, H.**, Hernandez-Viezcas, J.A., Corral-Diaz, B., Peralta-Videa, J.R., Gardea-Torresdey, J.L. (2012). Synchrotron micro-XRF and micro-XANES confirmation of the uptake and translocation of TiO₂ nanoparticles in cucumber (*Cucumis sativus*) plants. *Environmental Science and Technology* 46 (14), 7637- 7643.