

# Pablo Cruz-Hernández

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## Contact Information

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## Academic Performance

- 2012-16** Pre-doctoral Fellowship granted by the Sciences and Innovation Department in the University of Huelva (18 November 2016) “*Trace Elements Mobility during the Early Diagenesis of Iron Precipitates in Acid Drainage System*” Highest Qualification (*Cum Laude*).
- 2012** Master “*Geology and Environmental Management of the Mineral Sources*” from the Universities of Huelva and the International University of Andalusia including the Master's Thesis “*Corbicula Fluminea as pollutants biomonitor in AMD Affected River Basins*” (600 hours)
- 2009-11** Master “*Geologic Sources and Geotechnics*” University of Oviedo, including the Master's Thesis “*Hydrogeochemistry and Hydrogeology of the Gijon's Aquifer; Impact of Industrial Activities in its quality*” (900 hours)
- 2003-09** Bachelor degree **Geology** (3600 hours). University of the Basque Country (Spain)

## Professional Experience

- 2012-2016** Pre-doctoral researcher. Universidad de Huelva (Spain)
- 2011** Hydrogeological and Hydrochemistry Researcher for EMA Gijon (5 months)
- 2010-2011** Digital Cartography (ArcGIS), Quartz Quarry ERIMSA S.A. (4 months)

## Fellowships and Projects

- 2017-present** Postdoctoral research fellowship funded by FONDECYT Chile (Fondo Nacional de Desarrollo Científico y Tecnológico) (project 3170082, awarded with 80 mill CLP)
- 2014-2017** Project issued by Spanish Ministry of Economy and Competitiveness (Project: CGL2013-41862-C02-01, awarded with 101,000 €)

- 2014** Short stay grant at University of Saskatchewan (Canada) (issued by the Economy and Competitiveness Department of the Government of Spain) 4 months (6,500 €)
- 2013** Short stay grant at University of Saskatchewan (Canada) (issued by the Economy and Competitiveness Department of the Government of Spain) 4 months. (7,800 €)
- 2011-2015** FPI-MICINN Ph.D. Grant (issued by the Science and Innovation Department of the Government of Spain) “**The Cycle of Metals and their Impact on Water Quality in the Basin of the Odiel River**” (Project: CGL2010-21956-C02-02, awarded with 122,221 €)
- 2008-2009** Exchange Erasmus Program (European Change Program). Facoltà d’Science della Terra della Università degli Studi di Cagliari (Italy) (11,000 €)
- 2003-2009** 4 Scholarships granted by the Spanish Ministry of Education (tuition and housing) plus 3 travel grants for English studies. (20,000 € approx.)

### Refereed Publications in International Journals

- González-Fernández, Beatriz; Menéndez-Casares, Eduardo; Ramos-Muñiz, Francisco; **Cruz-Hernández, Pablo**; González Quirós, Andrés. (2014). Sources of mercury in groundwater and soils of west Gijón (Asturias, NW Spain). *Science of the Total Environment*. Vol. 481. 217-231. DOI: 10.1016/j.scitotenv.2014.02.034
- Parviainen, Annika; **Cruz-Hernández, Pablo**; Pérez-López, Rafael; Nieto, José Miguel; Delgado-López, J.M. (2015). Raman identification of Fe precipitates and evaluation of As fate during phase transformation in Tinto and Odiel River Basins. *Chemical Geology*. Vol. 398. 22-31. DOI: 10.1016/j.chemgeo.2015.01.022
- Carrero, Sergio; Pérez-López, Rafael; Fernandez-Martinez, Alejandro; **Cruz-Hernández, Pablo**; Ayora, Carlos; Poulain, Agnieszka. (2015). The overlooked role of Al-oxyhydroxysulfates as scavengers of contaminants in acid mine drainage. *Chemical Geology*. Vol. 417. 414-423. DOI: 10.1016/j.chemgeo.2015.10.020
- Dompierre, Kathryn A.; Lindsay, Matthew B. J.; **Cruz-Hernández, Pablo**; Halferdahl, Geoffrey M. (2016). Initial geochemical characteristics of fluid fine tailings in an oil sands end pit lake. *Science of the Total Environment*, Vol. 556, 196-206. DOI: 10.1016/j.scitotenv.2016.03.002.
- Cruz-Hernández, Pablo**; Pérez-López, Rafael; Parviainen, Annika; Lindsay, Matthew B.J.; Nieto, José Miguel. (2016). Behavior of trace elements during the aging of current to ancient iron terraces in acid drainage environment. *Catena*, Vol. 147, 385-393. DOI: 10.1016/j.catena.2016.07.049.
- Cruz-Hernández, P.**, Pérez-López, R., Nieto, J.M., 2017. Role of Arsenic During the Aging of Acid Mine Drainage Precipitates. *Procedia Earth Planet. Sci.* 17, 233–236. DOI:10.1016/j.proeps.2016.12.079

Macías, F., Pérez-López, R., Cánovas, C.R., Carrero, S., **Cruz-Hernandez, P.** 2017. Environmental Assessment and Management of Phosphogypsum According to European and United States of America Regulations. *Procedia Earth Planet. Sci.* 17, 666–669. DOI:10.1016/j.proeps.2016.12.178

Macías, Francisco; Canovas, Carlos R.; **Cruz-Hernandez, Pablo**; Carrero, Sergio; Asta, Maria P.; Nieto, Jose Miguel; Perez-Lopez, Rafael. An anomalous metal-rich phosphogypsum: characterization and classification according to international regulations. *Journal of Hazardous Materials*. Vol 331, 99-108. DOI: 10.1016/j.jhazmat.2017.02.015

**Cruz-Hernández, Pablo**; Carrero, Sergio; Pérez-López, Rafael; Fernandez-Martinez, Alejandro; Lindsay, Matthew B.J.; Nieto, Jose Miguel. The role of As(V) in the precipitation and ageing rates of iron oxides of acid mine drainage. Under review at *Chemical Geology*.

Perez-Lopez, Rafael; Carrero, Sergio; **Cruz-Hernandez, Pablo**; Asta, Maria P.; Macias, Francisco; Canovas, Carlos R.; Guglieri, Clara; Nieto, Jose Miguel. Sulfate reduction processes in salt marshes affected by phosphogypsum: implications for managing pore-water quality. Under review at *Environmental Science & Technology*.

### Congress Publications

**Cruz-Hernández, Pablo**; Carrero, Sergio; Sarmiento, Aguasanta M.; Pérez-López, Rafael; Ruiz-Cánovas, Carlos; Nieto, José Miguel: "¿Por qué mis ríos son rojos? Hidroquímica de un Ecosistema Único (Why are my rivers Red? Hydrochemistry of an Exceptional Ecosystem). Presented 17<sup>th</sup> Symposium about Geology Teaching (Huelva, July 2012)

Fernández, B; Menéndez-Casares, E; Ramos-Muñiz, F; **Cruz-Hernández, P**; González Quirós, A.: "Origen del Mercurio Presente en las Aguas Subterráneas del Oeste de Gijón (Mercury Source in the Groundwaters in West Gijon)" presented in the 7<sup>th</sup> Geologic Congress of Spain (Oviedo, July 2012).

Salamanca, M.J; Peret, A.M.; **Cruz-Hernández, P.**; de Orte, M.R.; Sarmiento, A.M; Delvalls, T.A: "Acute Sediments Toxicity Assessment in the River São Francisco, Brazil" presented in the SETAC Europe 22<sup>nd</sup> Annual Meeting (Berlin, May 2012)

**Cruz-Hernández, Pablo**; Parviainen, Annika; Pérez-López, Rafael; Nieto, José Miguel: "Evolución textural en terrazas formadas por precipitados de AMD (Textural Evolution in precipitates of formed terraces in AMD)". Presented for 33<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Caravaca de la Cruz, June 2013). Awarded special prize "Young Researchers; best oral presentation"

Parviainen, Annika; **Cruz-Hernández, Pablo**; Pérez-López, Rafael; Nieto, José Miguel: "Espectroscopía Raman en la Detección de Óxidos, Hidróxidos y Oxihidroxisulfatos de Fe en Río Tinto, suroeste de España (Raman Spectroscopy in the Detection of Oxides, hydroxides and Oxi-hydroxisulfaes of Fe in Tinto river, SW Spain)".

Presented for 33<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Caravaca de la Cruz, June 2013)

Pérez-López, Rafael; Sarmiento, Aguasanta M.; Carrero, Sergio; **Cruz-Hernández, Pablo**; Macías, Francisco; Pérez-Moreno, Silvia; Nieto, José Miguel; Bolívar, Juan Pedro: “Estimación del aporte de contaminantes de la balsa de fosfoyesos al Estuario de Huelva (Estimation of the contribution of pollutants from phosphogypsum disposal site to the Estuary of Huelva)”. Presented for 34<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Granada, July 2014)

**Cruz-Hernández, Pablo**; Lindsay, Matthew B.J.; Parviainen, Annika; Pérez-López, Rafael; Nieto, José Miguel: “Arsenic mobilization in iron precipitates from Acid Mine Drainages at different time-scales”. Presented for 34<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Granada, July 2014)

Carrero, Sergio; **Cruz-Hernández, Pablo**; Pérez-López, Rafael; Nieto, José Miguel: “Movilidad de Contaminantes durante la Neutralización Anóxica de Drenajes Ácidos de Mina (Pollutants Mobility during the Anoxic Neutralization of Acid Mine Drainages)”. Presented for 34<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Granada, July 2014). Awarded special prize “Young Researchers; best oral presentation”

Millán, Ricardo; **Cruz-Hernández, Pablo**; Carrero, Sergio; Pérez-López, Rafael: “Movilidad de Contaminantes en lixiviados de la balsa de fosfoyesos: Estrategias de tratamiento (Mobility of Pollutants in leaches from phosphogypsum disposal site: Treatment Strategies)”. Presented for 35<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Huelva, July 2015).

**Cruz-Hernández, Pablo**; Pérez-López, Rafael; Parviainen, Annika; Lindsay, Matthew B.J.; Nieto, José Miguel: “Comportamiento de los Metales Traza durante el envejecimiento de precipitados de Fe de drenaje ácido (Behavior of the trace elements during the ageing of acid drainage Fe precipitates)”. Presented for 35<sup>th</sup> Scientific Meeting of the Spanish Mineralogical Society (SEM) (Huelva, July 2015).

**Cruz-Hernández, Pablo**; Pérez-López, Rafael; Parviainen, Annika; Lindsay, Matthew B.J.; Nieto, José Miguel: “Behavior of Trace Elements during Aging of Acid Drainage Precipitates” Presented for **25<sup>th</sup> Goldschmidt Conference** (Prague, August 2015).

**Olías, Manuel, et al.**: “Obtención de los parámetro hidrodinámicos en un tramo del Río Odiel (Huelva) mediante un ensayo de trazadores (Hydrodynamic Parametres of a Strech of Odiel River, Huelva, during a tracer test)”. Symposium the Water in Andalucía (SIAGA). (Malaga, Novembre 2015).

**Cruz-Hernández, Pablo**; Pérez-López, Rafael; Nieto, José Miguel: Role of Arsenic during the Aging of Acid Mine Drainage Precipitates. 15th Water-Rock Interaction International Symposium.

- 2016** Membership in American Chemistry Society (ACS).
- 2015** Teaching: *Crystallography and Mineralogy* in Geology and Chemistry Degrees, *Silicates Mineralogy* in Geology Degree, *Economic Geology* in Environmental Sciences Degree (University of Huelva)
- 2015 –present** Reviewer of Journal of Hydrology (two works) and Journal of Environmental Management (1 work)
- 2015-present** Membership in European Association of Geochemistry
- Nov. 2014** Hands-on Course on the Pair Distribution Function Method (ALBA Synch.)
- July 2014** APS/IIT 2014 XAFS Summer School (Illinois Institute of Technology)
- 2014** *Crystallography and Mineralogy* Teacher in Geology Degree (University of Huelva)
- July 2013** Environmental Iron Isotopes (FIMIN workshop, The Hebrew University of Jerusalem)
- 2013** *Environmental Geology* Teacher in Geology Degree (University of Huelva)
- 2013-present** Membership in Spanish Mineralogical Society (SEM).
- October 2012** FIMIN course. "*Modeling of surface reactions of ferric (Hydr)oxides*" (University of Bayreuth).
- 2011-2015** Manager of Geochemistry and Environmental Geology Laboratory (University of Huelva)

### **Synchrotron Experiments (Approached beamtimes)**

- April 2013** **Ref: EV-62.** ESRF, Grenoble, France. Line BM26B and ID15B. 120 hours. (SAXS)
- Sept 2013** **Ref: 17-4962.** CLS, Saskatoon, Canada. Line SXRMB. 88 hours. (XANES)
- Nov. 2013** **Ref: 2013-3\*.** APS, Chicago, USA. Line GSECARS. 64 hours. ( $\mu$ -XRF mapping,  $\mu$ -XRD, EXAFS)
- Dec. 2013** **Ref: 18-5406\*.** CLS, Saskatoon, Canada. Line HXMA. 96 hours. (EXAFS)
- July 2014** **Ref: 19-5778\*.** CLS, Saskatoon, Canada. Line HXMA. 96 hours. (EXAFS)
- July 2014** **Ref: 2014-44\*.** APS, Chicago, USA. Line GSECARS. 88 hours. ( $\mu$ -XRF mapping,  $\mu$ -XRD, EXAFS)
- Sept. 2015** **Ref: EV-148.** ESRF, Grenoble, France. Line BM23 and BM26B. 144 hours.
- Dec. 2015** **In-house.** ESRF, Grenoble, France. Line ID15B. 72 hours. ( $\mu$ -XRD, Differential PDF).
- Sept. 2016** **Ref: 25-01 999\*.** ESRF, Grenoble, France. Line BM25A. 120 hours. (EXAFS) (applied)

(\* Main proposer)

## **Languages**

- First Language: Spanish
- Reading Skills: English (advance), Italian (advance), French and Portuguese
- Writing Skills: English (proficiency), Italian (advance)
- Verbal Skills: English (proficiency), Italian (advance)

## **Computing**

- Geographic Informatics Systems: ArcGIS, GeoMedia
- Synchrotron radiation: IFEFFIT Demeter pack (Athena, Hephaestus, Artemis), Larch pack (GSE), Fit2D.
- Water Chemistry and Aquifers Modeling: PHREEQC, Modflow, MT3D, PEST.
- Geophysics Modeling: Kingdom, SeisImager, Pickwin.
- XRD: Match!, X Powder.
- Drawing and Mapping Programs: Autocad, Freehand, Origin, Corel, Adobe pack.

## **Other Skills**

- Laboratory Equipment Management: ICP-MS, ICP-AES, Spectrophotometry, X-ray Diffraction, Optical and Electronic Microscopy (EPMA, SEM, TEM),  $\mu$ -raman spectroscopy.
- Synchrotron Radiation experiments conducting and data processing of SAXS, XAFS, XANES,  $\mu$ -XRF,  $\mu$ -XRD.
- Measurements Equipments (pH-meter, Conductivity-meter...)
- Ease in Laboratory samples (Sample preparation, Mineral synthesis, Laboratory Instrumentation, Sequential Extractions, Toxicological Assays).