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Languages

Spanish (mother tongue) and fluent in English.

Education

Ph.D. Chemistry, *with European Mention*, Autonomous University of Madrid, 2006.

M.A. Earth and Environmental Sciences, Autonomous University of Madrid, 2005.

B.S. Chemistry, Autonomous University of Madrid, 2003.

Experience

Current Profesional Situation

Profesor Titular (civil servant Senior Lecturer), Department of Geology and Geochemistry, Autonomous University of Madrid, Spain. **September 2023–present**.

Previous Experience

Visiting Researcher, Department of Materials Science and Engineering, University of Sheffield, United Kingdom. **September 2022–August 2024**.

Profesor Contratado Doctor (non-civil servant Senior Lecturer), Department of Geology and Geochemistry, Autonomous University of Madrid, Spain. **November 2016–August 2023**.

Profesor Contratado Doctor interino (Interim non-civil servant Senior Lecturer), Department of Geology and Geochemistry, Autonomous University of Madrid, Spain. **October 2015–November 2016**.

Profesor Titular interino (Interim Lecturer), Department of Geology and Geochemistry, Autonomous University of Madrid, Spain. **November 2009–July 2015**.

Postdoc, Cements and Materials Recycling Department, Eduardo Torroja Institute for Construction Science (CSIC), Madrid, Spain. **July 2008–October 2009**.

Postdoc, Rock-Water Interaction Group, Institute of Geological Sciences, University of Bern, Switzerland. **July 2006–June 2008**.

PhD Student, Department of Agricultural Chemistry, Geology and Geochemistry, Autonomous University of Madrid, Spain. **July 2003-June 2006**.

Fields of Research Interest

Development of cementitious materials and magnesium phosphate cements for encapsulation of radioactive waste

Clay barriers for high-level radioactive waste confinement: steel-clay-cement interactions and radionuclide retention for preservation of the biosphere.

Decontamination of soils and underground water by clay suspensions.

Decontamination of antibiotics and organic pollutants in surface waters by adsorption on clays

Environmental control of natural soils and surface waters.

CV Summary

Raúl Fernández is Professor of Geology and Geochemistry at the Autonomous University of Madrid (UAM), where his research combines experimental geochemistry, mineralogy and reactive transport modelling to understand the behaviour of clays, cements and engineered barriers for radioactive waste confinement and environmental remediation. His scientific contributions span from the geochemical reactivity of cement–bentonite interfaces to the development and optimisation of magnesium phosphate cements, integrating laboratory experimentation, thermodynamic modelling and scale-relevant interpretation for geological repositories and low- and intermediate-level waste immobilisation.

He has participated in multiple EU projects (5^{th}–7^{th} Framework Programme and Horizon 2020), including EURAD, PREDIS and EURAD-2, and has led or co-led work focused on steel–bentonite interactions under hydrothermal gradients, optimisation of cementitious formulations and assessment of alternative matrices such as geopolymers. At national level he has contributed to projects coupling geo- and bio-remediation for soils and horticultural ecosystems contaminated with antibiotics, and to the valorisation of industrial residues in construction materials, validating his experimental findings through thermodynamic calculations and quantitative mineralogical analyses. His publication record includes articles in journals such as *Applied Geochemistry*, *Applied Clay Science*, *Science of the Total Environment*, *Geochimica et Cosmochimica Acta* and *Cement and Concrete Composites*, technical reports for agencies such as Nagra and Enresa, and one monograph on reactive transport in cement–bentonite interfaces.

Over his career, Fernández has progressively assumed scientific leadership and responsibility within competitive academic and collaborative environments. Since 2019 he coordinates the UAM-recognised research group **Clays & Environmental Control** (nine members), where he leads research lines on engineered barriers, radioactive waste immobilisation and clay-based technologies for water and soil decontamination. He has served as principal investigator or local PI in projects such as the H2020 PREDIS project on pre-disposal waste management and a national TED2021 project focused on low-carbon magnesium phosphate cements for 3D-printed construction, while co-leading UAM participation in EURAD-2 across three work packages. Internationally, his expertise in bentonite–cement interactions and reactive transport has positioned him as a partner for agencies and utilities (Nagra, SKB) and for industrial stakeholders involved in barrier performance and long-term safety assessments. Between 2022 and 2024 he was visiting researcher at the University of Sheffield's Immobilisation Science Laboratory, working on the encapsulation of depleted and low-enriched uranium wastes in magnesium phosphate cement matrices, which strengthened international collaboration with other

researchers.

His research has generated knowledge that is directly transferred to technological development and innovation, particularly in nuclear waste management and environmental remediation. With companies such as Nagra he has contributed to the design, performance assessment and long-term interpretation of bentonite buffer materials, including development of comparative methodologies, experimental characterisation and modelling of concrete–clay interfaces in long-term in situ experiments. With Talantia he led a project on the transport of clay gels and suspensions through porous media for decontamination of soils and aquifers, and with Envirosoil he contributed to defining arsenic reference values and interpreting soil contamination data for decision-making. More recently, he has co-led work for the Spanish Air and Space Force on the sealing of obsolete fuel tanks, applying his knowledge of cementitious and clay-based systems to the long-term confinement of hazardous residues. In other projects, he has explored eco-efficient construction materials, such as zeolitised lightweight aggregates produced from clays and marine plastic litter, contributing to circular-economy approaches in construction. Alongside research outputs in peer?reviewed journals and conference proceedings, he has produced extensive technical documentation for public agencies and industry, facilitating uptake by non-academic end-users.

Fernández has an extensive teaching track record of over 2000 contact hours across 19 different courses in Chemistry, Environmental Sciences, Biology, Applied Chemistry and Waste and Wastewater Management, at both undergraduate and postgraduate levels. He has taught fundamental courses (Geology, Materials Science, Geochemistry, Environmental Contamination) and more specialised topics (Applied Environmental Geochemistry, Industrial Minerals, Waste Treatment and Recycling, Technologies for wastewater reuse), integrating research examples from radioactive waste, clays and environmental remediation into his teaching. He has supervised or co-supervised 18 Bachelor's theses and 8 Master's theses and has coordinated internship programmes and final Master projects for the Environmental Sciences degree and the *Waste and Wastewater Management for Resources Recovery* Master's Degree, which he is presently coordinating, overseeing the external practices of more than 120 students. He has also contributed to graduate education abroad through teaching collaborations at the University of Bern and the University of Sheffield. In terms of mentoring, his supervision in EURAD has supported the development of a PhD project on hydrothermal steel–bentonite interactions, and he has participated in six PhD examination committees, including one in Switzerland, contributing to the evaluation and career progression of young researchers.

Beyond research and teaching, Fernández contributes to the scientific community through editorial, evaluative and organisational roles. He is member of the editorial board of the journal Minerals (Q2 in JCR) and has reviewed more than 50 manuscripts for journals in mineralogy, geochemistry and environmental sciences, helping to maintain quality standards and methodological rigour in his field. Within UAM he has coordinated the Crystallography and Mineralogy teaching group and currently coordinates the **Clays & Environmental Control** research group, supporting the consolidation of interdisciplinary teams that connect geology, chemistry and environmental sciences. He maintains active membership in the Spanish Clay Society and regularly contributes to international meetings on clays, cement–clay interactions and radioactive waste, where he has presented invited and contributed talks and posters over more than two decades. Collectively, these activities demonstrate sustained leadership, commitment to open and responsible research assessment, and a continuous contribution to training, evaluation and knowledge transfer in nuclear waste management and environmental geochemistry.

Research

Peer-Reviewed Publications

Mota-Heredia, C., Cuevas, J. and **Fernández, R.** (2026). Evolution of steel-bentonite interactions under hydrothermal gradients: Mineralogical and geochemical implications for nuclear waste disposal. *Applied Clay Science*, **281**, 108084.

Fernández, R., Perez-Cortes, P., Marugán, E. I., Padilla-Encinas, P., Puertas, F., García-Lodeiro, I., Ruiz, A. I., Cuevas, J., Turrero, M. J., Alonso, M. C. and Torres, E. (2025). Comparative Assessment of Cement and Geopolymer Immobilization Approaches: Short-Term Leaching Performance of Thermally Treated Ion Exchange Resin Waste forms. *Applied Sciences*, **15**, (20), 11196.

Dabarera, A., **Fernández, R.** and Provis, J. (2024). A systematic review of engineering properties of magnesium potassium phosphate cement as a repair material. *Frontiers in Materials*, **11**, 1451079.

Moreno-Maroto, J. M., Govea, J. M., Poza, P., Regadío, M., Cuevas, J., Ruiz, A. I., **Fernández, R.** and Alonso-Azcárate, J. (2024). Hydrothermal Manufacture of Zeolitic Lightweight Aggregates from Clay and Marine Plastic Litter. *Applied Sciences*, **14**, (17), 7674.

Fernández-García, C., Padilla-Encinas, P., Alonso, M. C. and **Fernández, R.** (2024). Interaction of aluminum alloys with MKPC and Portland-based cements on the metal-matrix interface. *Applied Geochemistry*, **172**, 106105.

Fernández-García, C., Alonso, M. C., Bastidas, J. M., García-Lodeiro, I. and **Fernández, R.** (2024). MgO/KH2PO4 and Curing Moisture Content in MKPC Matrices to Optimize the Immobilization of Pure Al and Al-Mg Alloys. *Materials*, **17**, (6), 1263.

Mota-Heredia, C., Cuevas, J. and **Fernández, R.** (2024). Geochemical Evolution of Mg-Bentonite Affected by the Contact of Carbon Steel and a Hydrothermal Gradient. *Applied Sciences*, **14**, (3), 1259.

Mota-Heredia, C., Cuevas, J. and **Fernández, R.** (2024). Effect of Iron Chloride (II) on Bentonites under Hydrothermal Gradients: A Comparative Study between Sodium Bentonite and Calcium Bentonite. *Minerals*, **14**, (2), 132.

Padilla-Encinas, P., Dieguez, M., Cuevas, J., Ruiz, A. I. and **Fernández, R.** (2024). The Influence of the Magnesium-to-Phosphate Molar Ratio on Magnesium Potassium Phosphate Cement Properties Using Either Wollastonite or Volcanic Ash as Fillers. *Minerals*, **14**, (1), 103.

Rodríguez-Rastrero, M., Suárez, C. E., Ortega, A., Cuevas, J. and **Fernández, R.** (2023). Geochemical Anomalies in Soils and Surface Waters in an Area Adjacent to a Long-Used Controlled Municipal Landfill. *Sustainability*, **15**, (23), 16280.

Mota-Heredia, C., Cuevas, J., Ruiz, A., Ortega, A., Torres, E., Turrero, M. J. and **Fernández, R.** (2023). Geochemical interactions at the steel-bentonite interface caused by a hydrothermal gradient. *Applied Clay Science*, **240**, 106984.

Mon, A., Samper, J., Montenegro, L., Turrero, M. J., Torres, E., Cuevas, J., **Fernández, R.** and De Windt, L. (2023). Reactive transport models of the geochemical interactions at the iron/bentonite interface in laboratory corrosion tests. *Applied Clay Science*, **240**, 106981.

Dieguez, M., Ruiz, A. I., Cuevas, J., Alonso, M. C., García-Lodeiro, I. and **Fernández, R.** (2023). Evaluation of fillers for magnesium potassium phosphate cement (MKPC) for the encapsulation of low and intermediate level metallic radioactive wastes. *Materials*, **16** (2), 679.

Saphy, A., Tijero, M., García-Delgado, C., Ortega, A., Zamora, S., Ruiz, A.I., Eymar, E., Cuevas, J. and **Fernández, R.** (2022). Biogeofilter with hydrothermal treated stevensite clay and laccase enzymes for retention and degradation of tetracycline. *Minerals*, **12** (12), 1631.

Cuevas, J., Cabrera, M. A., Fernández, C., Mota-Heredia, C., **Fernández, R.**, Torres, E., Turrero, M. J. and Ruiz, A. I. (2022). Bentonite powder XRD quantitative analysis using Rietveld refinement: Revisiting and updating bulk semiquantitative mineralogical compositions. *Minerals*, **12**, (6), 772.

González-Santamaría, D. E., Justel, A., **Fernández, R.**, Ruiz, A., Stavropoulou, A., Rodríguez-Blanco, J. D. and Cuevas, J. (2021). SEM-EDX study of bentonite alteration under the influence of cement alkaline solutions. *Applied Clay Science*, **212**, 106223.

González-Santamaría, D. E., **Fernández, R.**, Ruiz, A., Ortega, A. and Cuevas, J. (2020). High-pH/low pH ordinary Portland cement mortars impacts on compacted bentonite surfaces: Application to clay barriers performance. *Applied Clay Science*, **193**, 105672.

González-Santamaría, D. E., **Fernández, R.**, Ruiz, A., Ortega, A. and Cuevas, J. (2020). Bentonite/CEM-II cement mortar interface experiments: a proxy to in situ deep geological repository engineered barrier system surface reactivity. *Applied Geochemistry*, **117**, 104599.

Cuevas, J., González-Santamaría, D. E., García-Delgado, C., Ruiz, A., Garralón, A., Ruiz, A. I., **Fernández, R.**, Eymar, E. and Jiménez-Ballesta, R. (2019). Impact of a tire fire accident on soil pollution and the use of clay minerals as natural geo-indicators. *Environmental Geochemistry and Health*, **42** (7), 2147-2161.

Cuevas, J., Dirocie, N., Yunta, F., García-Delgado, C., González-Santamaría, D. E., Ruiz, A. I., **Fernández, R.** and Eymar, E. (2019). Evaluation of the sorption potential of high surface minerals as geosorbents using tetracycline as a model pollutant. *Minerals*, **9** (7), 453-474.

Torres, E., Turrero, M. J., Garralón, A., Cuevas, J., **Fernández, R.**, Ortega, A. and Ruiz, A. I. (2019). Stable isotopes applied to the study of the concrete/bentonite interaction in the FEBEX in situ test. *Applied Geochemistry*, **100**, 432-443.

Cuevas, J., Ruiz, A. I., **Fernández, R.**, González-Santamaría, D., Angulo, M., Ortega, A., Torres, E. and Turrero, M. J. (2018). Authigenic clay minerals from interface reactions of concrete-clay engineered barriers: A new perspective on Mg-clays formation in alkaline environments. *Minerals*, **8**, 9, 362-379

Ruiz, A. I., Ortega, A., **Fernández, R.**, Miranda, J. F., López-Samaniego, E. and Cuevas, J. (2018). Thermal treatment of asbestos containing materials (ACM) by mixing with Na_2CO_3 and special clays for partial vitrification of waste. *Materials Letters*, **232**, 29-32.

González-Santamaría, D. E., Angulo, M., Ruiz, A. I., **Fernández, R.**, Ortega, A. and Cuevas, J. (2018). Low-pH cement mortar-bentonite perturbations in a small-scale pilot laboratory experiment. *Clay Minerals*, **53**, 2, 237-254.

Fernández, R., Ruiz, A. I., García-Delgado, C., González-Santamaría, D. E., Antón-Herrero, R., Yunta, F., Poyo, C., Hernández, A., Eymar, E. and Cuevas, J. (2018). Stevensite-based geofilter for the retention of tetracycline from water. *Science of the Total Environment*, **645**, 146-155.

Samper, J., Mon, A., Montenegro, L., Cuevas, J., Turrero, M. J., Naves, A., **Fernández, R.** and Torres, E. (2018). Coupled THCM model of a heating and hydration concrete-bentonite column test. *Applied Geochemistry*, **94**, 67-81.

Fernández, R., González-Santamaría, D., Angulo, M., Torres, E., Ruiz, A. I., Turrero, M. J. and Cuevas, J. (2018). Geochemical conditions for the formation of Mg silicates phases in bentonite and implications for radioactive waste disposal. *Applied Geochemistry*, **93**, 1-9.

Cuevas, J., Ruiz, A. I. and **Fernández, R.** (2018). Investigating the potential barrier function of nanostructured materials formed in engineered barrier systems (EBS) designed for nuclear waste isolation. *The Chemical Record*, **18**, 1065-1075.

González-Santamaría, D. E., López, E., Ruiz, A. I., **Fernández, R.**, Ortega, A. and Cuevas, J. (2017). Adsorption of phenanthrene by stevensite and sepiolite. *Clay Minerals*, **52**, 3, 341-350.

Fernández, R., Torres, E., Ruiz, A. I., Cuevas, J., Alonso, M. C., García Calvo, J. L., Rodríguez, E. and Turrero, M. J. (2017). Interaction processes at the concrete-bentonite interface after 13 years of FEBEX-Plug operation. Part II: Bentonite contact. *Physics and Chemistry of the Earth, Parts A/B/C*, **99**, 49-63.

Alonso, M. C., García Calvo, J. L., Cuevas, J., Turrero, M. J., **Fernández, R.**, Torres, E. and Ruiz, A. I. (2017). Interaction processes at the concrete-bentonite interface after 13 years of FEBEX-Plug operation. Part I: Concrete alteration. *Physics and Chemistry of the Earth, Parts A/B/C*, **99**, 38-48.

Fernández, R., Ruiz, A. I. and Cuevas, J. (2016). Formation of C-A-S-H phases from the interaction between concrete or cement and bentonite. *Clay Minerals*, **51**, 2, 223-235.

Cuevas, J., Ruiz, A. I., **Fernández, R.**, Torres, E., Escribano, A., Regadío, M. and Turrero, M. J. (2016). Lime mortar-compacted bentonite–magnetite interfaces: An experimental study focused on the understanding of the EBS long-term performance for high-level nuclear waste isolation DGR concept. *Applied Clay Science*, **124-125**, 79-93.

Alt-Epping, Tournassat, C., Rasouli, P., Steefel, C. I., Mayer, K. U., Jenni, A., Mäder, U., Sengor, S. and **Fernández, R.** (2015). Benchmark reactive transport simulations of a column experiment in compacted bentonite with multi-species diffusion and explicit treatment of electrostatic effects. *Computational Geosciences*, **19**, 3, 535-550.

Fernández, R., González, L., Ruiz, A. I. and Cuevas, J. (2014). Nature of C-(A)-S-H phases formed in the reaction bentonite/portlandite. *Journal of Geochemistry*, **2014**, 1-8.

Leguey, S., Ruiz, A. I, **Fernández, R**. and Cuevas, J. (2014). Resistant cellulose-derivative biopolymer templates in natural sepiolite. *American Journal of Science*, **314**, 1041-1063.

Fernández, R., Ruiz, A. I. and Cuevas, J. (2014). The role of smectite composition on the hyperalkaline alteration of bentonite. *Applied Clay Science*, **95**, 83-94.

Fernández, R., Vigil de la Villa, R., Ruiz, A. I., García, R. and Cuevas, J. (2013). Precipitation of chlorite-like structures during OPC porewater diffusion through compacted bentonite at 90 ºC. *Applied Clay Science*, **83-84**, 357-367.

Vigil de la Villa, R., **Fernández, R.**, Rodríguez, O., García, R., Villar-Cociña, E. and Frías, M. (2013). Evolution of the pozzolanic activity of a thermally treated zeolite. *Journal of Materials Science*, **48**, 8, 3213-3224.

Ruiz, A. I., **Fernández, R.**, Sánchez, N., Rodríguez, M., Regadío, M., de Soto, I. and Cuevas, J. (2012). Improvement of attenuation functions of a clayey sandstone for landfill leachate containment by bentonite addition. *Science of the Total Environment*, **419**, 81-89.

Fernández, R. (2011). Engineered barriers for radioactive waste confinement. *Materiales de Construcción*, **61**, 303, 485-492.

Fernández, R., Rodríguez, M., Vigil de la Villa, R. and Cuevas, J. (2010). Geochemical constraints on the stability of zeolites and C-S-H in the high pH reaction of bentonite. *Geochimica et Cosmochimica Acta*, **74**, 3, 890-906.

Fernández, R., Cuevas, J. and Mäder, U. K. (2010). Modeling experimental results of diffusion of alkaline solutions through a compacted bentonite barrier. *Cement and Concrete Research*, **40**, 8, 1255-1264.

Fernández, R., Nebreda, B., Vigil de la Villa, R., García, R. and Frías, M. (2010). Mineralogical and chemical evolution of hydrated phases in the pozzolanic reaction of calcined paper sludge. *Cement and Concrete Composites*, **32**, 10, 775-782.

Vigil de la Villa, R., **Fernández, R.**, García, R., Villar-Cociña, E. and Frías, M. (2009). Pozzolanic activity and alkaline reactivity of a mordenite-rich tuff. *Microporous and Mesoporous Materials*, **126**, 1-2, 125-132.

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Cuevas, J., Vigil de la Villa, R., Ramírez, S., Sánchez, L., **Fernández, R.** and Leguey, S. (2006). The alkaline reaction of FEBEX bentonite: a contribution to the study of the performance of bentonite/concrete engineered barrier systems. *Journal of Iberian Geology*, **32**, 2, 147-169.

Fernández, R., Cuevas, J., Sánchez, L., Vigil de la Villa, R. and Leguey, S. (2006). Reactivity of the cement-bentonite interface with alkaline solutions using transport cells. *Applied Geochemistry*, **21**, 6, 977-992.

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Books

Fernández, R. (2011). Transporte reactivo en la interfase mortero de cemento-bentonita. *Editorial Académica Española*, 256 pp.

Book chapters

Fernández, R., Rodríguez, M., Vigil de la Villa, R. and Cuevas, J. (2009). Alteración de bentonita compactada por difusión de fluidos alcalinos a 90 ºC. **in:** *Biblioteca Electrónica de la Excma. Diputación Provincial de Soria*, **Núm. 17**, 543-552.

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Fernández, R., Mäder, U., Sánchez, L., Vigil de la Villa, R. and Cuevas, J. (2007). Alkaline diffusion in compacted bentonite: Experiments and modeling. **in:** *Water-Rock Interaction 12*, **Vol. 1**, 305-308.

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Reports

PREDIS. Contributing Authors: KIPT: Sergey Sayenko, Vladimir Shkuropatenko, Yevhenii Svitlychnyi; CNRS: Kim-Khanh Le, Davide Rodrigues, Sylvie Delpech, Céline Cannes; ORANO: Lavinia Stefan; CSIC: Carla Fernández-García, María Cruz Alonso; UAM: Mikel Dieguez, Pilar Padilla-Encinas, Jaime Cuevas, Ana Isabel Ruiz, Raúl Fernández. Lead Author: **Fernández, R.** (2024). Characterization of magnesium phosphate cement and low-cost magnesium phosphate cement. *PRE-DISposal management of radioactive waste*, **945098**, 1-67.

Ruiz, A. I., Ortega, A., **Fernández, R.**, and Cuevas, J. (2016). Caracterización de los ensayos de conversión termoquímica de residuos con contenido en amianto. CDTI, 186 pp.

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Jenni, A., Mäder, U. and **Fernández, R.** (2014). Multi-component advective-diffusive transport experiment in MX-80 compacted bentonite: method and results of 2^{nd} phase of experiment and post morten analysis. *Nagra Working Report*, **NAB 14-22**, 1-34.

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Participation in Research Projects

EURAD-2. European Partnership on Radioactive Waste Management. European Union, Programme H2020. Project 101166718. 2024-2029.

ZEUS ¿Y si la Zeolitización es la solución? Desarrollando un método Eficiente para abordar la Urgente necesidad de materiales de construcción Sostenibles. PID2023146912OAI00. Generación de Conocimiento 2023, Ministerio de Ciencia Innovación y Universidades. 2024-2027.

OZEONIC. Aplicación de residuos plásticos marinos como componentes tecnológicos en la fabricación de cerámicas zeolitizadas. Proyectos de Investigación 2023, VI Edición de los Premios Mares Circulares. Chelonia and CocaCola Europacific Partners. 2024.

SUMAC_3D. Hormigón sostenible de fosfato de magnesio para construcción mediante impresión 3D como acelerador hacia una transición eco-digital de la sociedad. Spanish State Research Agency. Project TED2021-130142B-I00. 2022-2024.

BIOGEHORTFILTER. Optimizing food safety through remediation of intensive horticultural ecosystems contaminated with antibiotics: New biogeofilters. Spanish State Research Agency, European. NextGeneration EU, I+D+I (modality "Proof of Concept"). Project PDC2021-120744-I00. 2021-2023.

PREDIS: Pre-disposal management of radioactive waste. European Union, Programme H2020. Project 945098. 2020-2024.

EURAD: European Joint Programme on Radioactive Waste Management. European Union, Programme H2020. Project 847593. 2019-2024.

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Interpretación y análisis de arcillas (DRX, SEM-EDX, CEC). Financed by REE Uno SPA (Minera Biolantánidos, Chile), (FUAM 54340), 2015.

ECOSUBSTRATE III. Bioremediation of ecosystems contaminated by heavy metals and persistent organic contaminants using eco-efficient substrates and amendments, *Spanish Ministry of Economy and Competitiveness, National Programme for Research Aimed at the Challenges of Society*, 2014-2017.

Conversión termoquímica de residuos con contenido en amianto. Empresa financiadora DESAMIANTA, Subcontratación CDTI IDI 20141185 (FUAM 54341). 2014-2016.

Estudio de la función de materiales compuestos arcilla-arena naturales como agentes de retardo y atenuación de la propagación de efluentes contaminados. Ministerio de Ciencia e Innovación (CMT2011-24025). 2012.

PEBS (Long-term Performance of the Engineered Barrier System), *EU 7th Framework Programme, EURATOM*, 2011-2014.

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Experimentación en rutas de síntesis Geo- y Bio-inspiradas para la formación de sepiolita, *Spanish Ministry of Science and Innovation*, 2009-2011.

Development of a method for bentonite comparison. Phase 1, *Nagra (Swiss Cooperative for the disposal of Radioactive waste)*, 2010.

Valorización de lodos de destintado del papel para la obtención de un producto de alto valor añadido en aplicaciones constructivas: estudio científico-técnico de proceso-aplicaciones y análisis integrado de la mejora medioambiental, *Spanish Ministry of Science and Innovation*, 2008-2009.

LOT (Long term test of buffer material), *SKB (Swedish Nuclear Fuel and Waste Management Company)*, 2006-2008.

Engineered Barrier System Modelling Task Force, EBS-TF, *SKB (Swedish Nuclear Fuel and Waste Management Company)*, 2006-2008.

Long-Term Cement Studies, *Nagra (Swiss Cooperative for the disposal of Radioactive waste)*, 2006-2008.

Swiss Bentonite R&D Program, *Nagra (Swiss Cooperative for the disposal of Radioactive waste)*, 2006-2008.

CI Project (Cement Interaction) at Mont-Terri URL, *Nagra (Swiss Cooperative for the disposal of Radioactive waste)*, 2006-2008.

NF-PRO. Understanding and physical and numerical modelling of the key processes in the near-field, and their coupling, for different host rocks and repository strategies, *EU 6th Framework*

Programme, EURATOM, 2004-2006.

ECOCLAY II (Effect of Cement On CLAY barrier performance - Phase II), *EU* 5^{th} *Framework Programme, EURATOM*, 2002-2003.

Participation in Conferences and Seminars

P. Padilla-Encinas, **R. Fernández**, J. Cuevas, C. Marieta, M. Frías and A. Guerrero. (2024). Low carbon footprint magnesium phosphate cement for 3D concrete printing. International Conference on Concrete and Digital Fabrication. September 4-6, 2024, *Munich, Germany*.

Fernández, R., Perez-Cortes, P., Marugán, E., Dieguez, M., Padilla-Encinas, P., Martínez, R., Puertas, F., García-Lodeiro, I., Ruiz, A. I., Cuevas, J., Turrero, M. J. Alonso, M. C. and Torres, E. (2023). Leaching behaviour of cement encapsulated thermally treated organic ion exchange resins. Joint 6th International Workshop on Mechanisms and Modelling of Waste/Cement Interactions. JCCW 2023. November 20-24, 2023, *Prague, Czech Republic*.

R. Fernández, I. García-Lodeiro, M. Dieguez, A.I. Ruiz, M.C. Alonso (2022). Towards the optimisation of magnesium phosphate cements formulations for reactive metals encapsulation. NUWCEM 2021 – 4^{th} International Symposium on Cement-Based Materials for Nuclear Wastes, May 4-6, 2022, *Avignon, France*.

Mota-Heredia, C., González-Santamaría, D., Ruiz A. I., Cuevas J., Torres, E., Turrero, M. J. and **Fernández, R.** (2019). Diseño experimental para el estudio de alteración hidrotermal de bentonita en contacto con acero. Jornada Científica de la Sociedad Española de Arcillas. November 15, 2019, *Madrid, Spain*.

Fernández, R., Ruiz, A. I., García-Delgado, C., González-Santamaría, D., Yunta, F., Eymar, E. and Cuevas, J. (2018). Estudio de efectividad de un geofiltro basado en estevensita para la retención de tetraciclina en agua. XXV Reunión Científica de la Sociedad Española de Arcillas. July, 5-7, 2018, *Zamora, Spain*.

Ruiz, A. I., Ortega, A., **R. Fernández**, Miranda, J. F., López-Samaniego, E. and Cuevas, J. (2017). Thermal treatment of asbestos containing materials (ACM) by mixing with Na_2CO_3 and special clays for partial vitrification of waste. Vitrogeowastes. September 14-15, 2017, *Elche, Spain*.

R. Fernández, D. González-Santamaría, M. Angulo, E. Torres, A.I. Ruiz, M.J. Turrero and J. Cuevas (2017). Formation of magnesium sheet silicates as a consequence of the alkaline perturbation of a bentonite barrier. The 7^{th} International Conference on Clays in Natural & Engineered barriers for radioactive waste confinement. September 24-27, 2017, *Davos, Switzerland*.

Torres, E., Turrero, M. J., **Fernández, R.**, Ruiz, A. I. and Cuevas, J. (2016). Characterization of the concrete/bentonite interfaces from scale-model column experiments: Significance for upscaling. 4th International Workshop on Mechanisms and Modelling of Waste/Cement Interactions. May 22-25, 2016, *Murten, Switzerland*.

R. Fernández, A. I. Ruiz and J. Cuevas (2015). Nature of C-(A)-S-H phases formed from the interaction between concrete and bentonite. Clays in Natural & Engineered barriers for radioactive waste confinement. Mass transfer and porous media, 154-155. 6^{th} International Meeting, March 23-26, 2015. *Brussels, Belgium*.

A. I. Ruiz, M. Regadío, A. Ortega, **R. Fernández** and J. Cuevas (2013). Natural and reconstituted arkosic sedimentary rocks as landfill barriers for major solutes transport retardation. 14th EuCheMS International Conference on Chemistry and the Environment, June 25-28, 2013. *Barcelona, Spain*.

A. Jenni, **R. Fernández**, C. I. Steefel and U. Mäder (2012). Multi-component reactive transport in bentonite: model and experiment. Clays in Natural & Engineered barriers for radioactive waste confinement. Mass transfer and porous media, 478-479. 5th International Meeting, October 22-25, 2012. *Montpellier, France*.

R. Fernández, A. I. Ruiz and J. Cuevas (2011). Influence of a hyperalkaline solution on six different bentonites with potential use as buffer barriers for radioactive waste confinement. NUWCEM 2011. 1st International Symposium on Cement-based Materials for Nuclear Wastes. October 11-14, 2011. *Avignon, France*.

R. Fernández, A. I. Ruiz, R. Vigil de la Villa and J. Cuevas (2011). A SEM-EDX study of the processes at the concrete/compacted bentonite interface. NEA ClayClub Workshop. Clays under Nano- to Microscopic resolution. September 6-8, 2011. *Karlsruhe, Germany*.

R. Fernández, U. K. Mäder and C. I. Steefel (2011). Modelling of a bentonite column experiment with CrunchFlow including new clay-specific transport features. Mineralogical Magazine 75 (3). Abstracts of the 21th Annual V.M. Goldschmidt: p 839. (ISSN 0026-461X, Online ISSN: 1471-8022). August 14-19, 2011. *Prague, Czech Republic*.

Fernández, R., Vigil de la Villa, R., Rodríguez, O., García, R., Villar-Cociña, E. and Frías, M. (2011). Characterization and pozzolanic activity of a calcined natural zeolite. Cementing a sustainable future: XIII ICCC International Congress on the Chemistry of Cement Madrid, 3-8 July, 2011: abstracts and proceedings. (ISBN: 9788472923997). 2011. *Madrid, Spain*.

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R. Fernández, R. García, R. Vigil de la Villa and J. Cuevas (2010). Chlorite formation at 90 ºC by diffusion of hyperalkaline fluids through compacted bentonite. Topic 4: Environment & Energy, 235-236. 2010-Trilateral Meeting on Clays (2010TMC). June 8-10, 2010. *Seville, Spain*.

Raúl Fernández, Jaime Cuevas, Manuel Rodríguez, Raquel Vigil de la Villa and Miguel A. Cuñado (2009). The stability of zeolites and C-S-H in the high pH reaction of bentonite. NEA's Workshop on Cementitious Materials in Safety Cases for Geological Repositories. NEA/RWM/R(2012)3/REV. Appendix D: Workshop Posters 219-223. November 17-20, 2009. *Brussels, Belgium*.

Frías Rojas, M., Rodríguez Largo, O., Sánchez de Rojas, M. I., **Fernández, R.** and Nebreda, B. (2009). Thermal activation of a paper waste as pozzolan for the manufacture of cements. 1st Spanish National Conference on Advances in Materials Recycling and Eco – Energy Madrid. (ISBN: 978-84-7292-3980-0), November 12-13, 2009. *Madrid, Spain*.

R. Fernández, U. K. Mäder and A. J. Appelo (2009). Modelling of multicomponent ion transport in compacted bentonite. Geochimica et Cosmochimica Acta 73 (13) Supplement 1. Abstracts of the 19th Annual V.M. Goldschmidt: A366. (ISSN: 0016-7037). June 21-26, 2009. *Davos, Switzerland*.

Raúl Fernández, Urs K. Mäder, Manuel Rodríguez, Raquel Vigil de la Villa and Jaime Cuevas (2009). Alteration of compacted bentonite by diffusion of highly alkaline solutions. 14^{th} International Clay Conference. June 14-19, 2009. *Castellaneta Marina, Italy*.

R. Fernández, U. Mäder and J. Cuevas (2008). Diffusion of an alkaline and hyperalkaline solution through compacted Mg-saturated bentonite. 2^{nd} International Workshop: Mechanisms and modelling of waste/cement interactions. October 12-16, 2008. *Le Croisic, France*.

Cuevas, J., **Fernández, R.**, Sánchez, L., Vigil de la Villa, R., Rodríguez, M. and Leguey, S. (2007). Reactive diffusion front driven by an alkaline plume in compacted Mg-homoionic bentonite. Clays in Natural & Engineered barriers for radioactive waste confinement. Mass transfer and porous media, 509-510. 3^{rd} International Meeting, September 17-20, 2007. *Lille, France*.

Fernández, R., Mäder, U. K. and Soler, J. M. (2007). Comparison of thermodynamic data for aqueous species with focus on hyperalkaline conditions. Geochimica et Cosmochimica Acta 71 (15) Supplement 1. Abstracts of the 17^{th} Annual V.M. Goldschmidt: A273. (ISSN: 0016-7037). August 19-24, 2007. *Cologne, Germany*.

Cuevas, J., **Fernández, R.**, Vigil de la Villa, R., Rodríguez, M., Leguey, S. and Cuñado, M. A. (2007). Reactivity/transport investigations on the detailed understanding of the chemical reactions at the bentonite-concrete interface. NF-PRO (sixth framework programme of the European Commission). NF-PRO'S 4^{th} Workshop. October 16, 2007. *Brussels, Belgium*.

L. Sánchez, J. Cuevas, **R. Fernández**, D. Ruiz de León, R. García, R. Vigil de la Villa and S. Leguey (2005). Dissolution of montmorillonite and precipitation kinetics of secondary minerals in hyperalkaline conditions at 75-200ºC. Clays in Natural & Engineered barriers for radioactive waste confinement. Alteration processes, 323-324. 2^{nd} International Meeting, March 14-18, 2005. *Tours, France*.

Sánchez, L., Cuevas, J., Ramírez, S., **Fernández, R.**, Vigil de la Villa, R. and Leguey S. (2003). Mineralogy of bentonite by alkaline fluids in closed and open experimental systems. June 22-26, 2003. Euroclay 2003. *Modena, Italy*.

Teaching

Autonomous University of Madrid (2004-2006)

Crystallography – Bachelor in Chemistry (2004-2006)

University of Bern (2006-2008)

Collaboration in **Aqueous Geochemistry** - Master of Science, Specialty in Environmental and Resource Geochemistry (2006/07)

Collaboration in **Geochemical Modeling of Natural and Contaminated Groundwaters** - Master of Science, Specialty in Environmental and Resource Geochemistry (2006/07)

Autonomous University of Madrid (2009-2025)

Geology – Grade in Environmental Sciences (2009/10)

Mineral Physic-chemistry - Bachelor in Chemistry (2009/10)

Natural Resources - Bachelor in Environmental Sciences (2010-12)

Laboratory of Geology - Bachelor in Environmental Sciences (2010-12)

Geology - Grade in Biology (2009-12; 2015-18, 2020)

Industrial Minerals - Master in Applied Chemistry (2011/12)

Treatment, Manipulation and Recycling of Residues - Bachelor in Environmental Sciences (2010-12)

Geology - Grade in Chemistry (2012/13; 2018-22, 2024-25)

Chemical Contamination of Natural Systems - Master in Applied Chemistry (2011-15)

Contamination of the Environment and its Evaluation - Degree in Environmental Sciences (2011-22, 2024-25)

Materials Sciences - Grade in Chemistry (2012-22)

Residues - Grade in Environmental Sciences (2011-18; 2022, 2024-25)

Applied Environmental Geochemistry - Master in Applied Chemistry (2016-22, 2024-25)

Geochemistry - Grade in Chemistry (2018-22)

Internship Program Coordinator - Degree in Environmental Sciences (2015-18)

Internship Program Coordinator - Master of Solid and Water Waste Management for Resources Recovery (2019-22, 2024-25)

Technologies for the treatment and reuse of urban wastewater - Master of Solid and Water Waste Management for Resources Recovery (2019-22, 2024-25)

Advising

Ph'D supervision

Carlos Mota-Heredia (2024): Alteración hidrotermal de la bentonita en el contacto con acero. *Universidad Autónoma de Madrid*

Undergraduate & Graduate Students

Grade in Chemical Engineering: Lorena González (2012).

Grade in Chemistry: Alejandro Arroyo (2013), Diana Sanjurjo (2015), Laura Díez (2019), Miguel Angel Sabador (2021), Pedro López-Tello (2022), Beatriz Madrigal (2025), María Obispo (2025)

Grade in Environmental Sciences: María Angulo (2014), Elena López (2015), Esteban Mitsou & Andrea Hernández (2016), Claudia Poyo (2017), María Luisa Blázquez & Sara Flores & Olga Fáfila (2019), Elena Calvo & Mónica Martínez (2020)

Grade in Biology: Esther Rodríguez (2020)

Master in Applied Chemistry: Carmen Suarez (2017), Mikel Dieguez (2021)

Master of Solid and Water Waste Management for Resources Recovery: Jerónimo Martínez (2020), Roberto López (2021), Marta Ramos (2022), Luis Alvear (2022), Jose Fernando Corani (2025)

Other Professional Activities

Reviewer of more than 50 manuscripts for the journals: Applied Clay Science, Applied Geochemistry, Clay Minerals, Clays and Clay Minerals, Journal of Physics and Chemistry of the Earth, Journal of Contaminant Hydrology, Cement and Concrete Composites, Minerals...

Coordinator of the Crystallography and Mineralogy group in the Department of Geology and Geochemistry of the Autonomous University of Madrid, 2015-2022, 2024-present

Coordinator of the Clays & Environmental Control research group, since 2019

Member of the Spanish Clay Society

Member of the editorial board of *Minerals (ISSN: 2075-163X)*

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