

Johanna M. Mejia Arcila

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HIGHLIGHTS

- PhD in Engineering, B.S in Materials Engineering
- Research experience in alkali activation technology, geopolymers, ceramic, refractory and building materials.
- Motivated to transform and upgrade industrial and agro-industrial by-products into ceramic and cementitious products used in civil infrastructure and high temperature applications.
- Experienced in life cycle analyses (LCA) of materials and products.
- Leadership, planning, communication and project development.
- Language: Spanish and English

EDUCATION

- 2019-2020** **EIA University** (Universidad EIA) (Envigado, Colombia)
Postdoctorate
- 2010-2017** **Valley University (Universidad del Valle)** (Cali, Colombia)
Ph.D., Engineering, Department of Materials engineering; GPA 4,89/5
- 2005-2010** **Valley University (Universidad del Valle)** (Cali, Colombia)
B.S, Materials Engineering, Department of Materials Engineering; GPA 4,03/5

COMPLEMENTARY STUDIES

- 11,2020- 03, 2021.** Universidad Sergio Arboleda. Bogota, Colombia
Short course: Certificable competence in Circular Economy (online)
Intensity: 94 hours
- 07, 2018- 09, 2018** Instituto superior medioambiental. España, Madrid.
Short course: Life cycle analysis methodology. Sima Pro as a tool for LCA.
Intensity 80 hours.
- 08, 2017- 11, 2017.** Pontificia Javeriana University. Bogota, Colombia
Short course: Sustainable construction, Leed® Leadership in Energy & Environmental Design.
Intensity: 144 hours

TEACHING EXPERIENCE

- 08, 2013- 12, 2013. Assistant professor**
Valley University (Universidad del Valle)
Elective course: Minerals and Industrial waste valorization applied to the ceramic industry.
- 08-2019- 06-2020. Assistant professor**
EIA University (Universidad EIA)
Seedbed course: Materials and alternative products

INDUSTRIAL EXPERIENCE

- 09, 2021 – to date . Chief Technology Officer**
TRUCE GLOBAL. Carrollton, KY. USA

Contribution:

Serve on the executive committee to align research and technology goals.
Identify new technologies and products to develop long and short term.
Identify waste streams to divert from landfills adding a commercial value.
Create KPIs and follow their performance for each project.
Create circular economy business models and sustainable strategies.

Current projects

- By-product based-fertilizer development and production
- By-product based- roofing tiles product development
- By-product based-Home and décor elements development and production

RESEARCH EXPERIENCE

06, 2019- 06, 2020 Postdoctoral researcher

EIA University (Universidad EIA). Medellin, Colombia.

Research project name: Development of a lightweight composite material cured by using CO₂ technology, based on an alkaline activated matrix (based on fly ash and debris) and polyurethane wastes as aggregates.

Contributions: Project proposal planning and writing. Project and budget management, and scientific support during the project operation. Product design, chemical formulation, characterization, and data analysis. Bachelor thesis advisor.

08, 2010 - 12, 2016. Researcher Assistant/ Ph.D student

Valley University (Universidad del Valle)

Research projects:

- **2013-2016 HYBRICEMENT**

Research and design of alkali-activated hybrid and binary cementitious binders to fabricate blocks, pavers, wall tiles, and refractory mortar with a high working performance at 1450°C.

Contributions: Project proposal planning and writing; statistics design analysis, chemical formulation, preparation of specimens; physical-mechanical and thermal tests, microstructural characterization, data collecting, and analysis.

Other activities were associated with the writing of scientific publications and patent writing, and participation in international conferences and, bachelor thesis advisory.

- **2013-2016 PUZOGEOH**

Study of the influence of the particle size of the raw material on setting time, heat release and mechanical strength on geopolymers binders based on volcanic pozzolan. Life cycle assessment on hybrid concrete based on alkali activated pozzolan.

Contributions: Project proposal planning and writing, chemical formulation, statistical design analyses, data collecting and analysis, life cycle assessment and physical-mechanical characterization. Other activities were associated to writing of scientific publications and bachelor thesis advisory.

- **2012-2014 GEOCERAM**

Development of binary alkali activated binders systems with low CO₂ foot-print based on fly ash, fluid catalytic cracking catalyst, rice-husk ash and ground furnace slag, to be used as a cementitious base in mortars and concrete materials, for building applications.

Contributions: Chemical formulation, sample preparation, mechanical and microstructural characterization, final report and scientific publications writing.

- **2010-2011** Sodium silicate and precipitated silica production from rice husk ash.

Fabrication of sodium silicate and precipitated silica from two types of rice husk ash, the study include set up working conditions such as temperature, time and alkali hydroxide molarity to obtain high quality products fulfilling commercial standards.

Contributions: Laboratory work, microstructural and physic properties analyses. Scientific and technical report writing.

CONSULTING EXPERIENCE

- **11, 2020- to date. Scientific consultant**
EIA University (Universidad EIA). Medellin, Colombia

Research project: Development and evaluation of a cementitious matrix composite material for extrusion molding, based on industrial and urban waste with CO₂ mineralization capacity in the structure.

Contributions: Project and budget management, scientific advisory and support during the project operation. Materials chemical formulation and designing. Materials characterization and life cycle analysis.

- **03- 08, 2010. Technical consultant**
Alex Cojucaru. Cali, Colombia

Consulting on research and development of materials to design and develop of lightweight Portland cement blocks, using rice husk ash as a fine aggregate and a chemical foam agent to create porosity. The product was mechanically and physically tested following Colombian standards.

TRAINING

- Internship at Louisiana Tech University (Louisiana, USA), March, 2014 to December, 2014
- Internship at Instituto de Ciencias de la construcción Eduardo Torroja (Madrid, Spain), October 2011 to November, 2011

SKILLS

- Working knowledge and understanding of instrumental techniques and laboratory equipment including: X-ray diffraction, IR-FT spectroscopy, Scanning electronic microscopy, nuclear magnetic resonance, thermal analyses (TG/DTG/DTA), thermal dilatometry test, thermal conductivity (hot disk) test, mechanical test (compressive, flexural and tensile strength) and isothermal calorimetry.
- Experience in Life cycle analyses of materials by using Open LCA software and ecoinvent database.
- Software experience: Panalytical Xpert high score plus, Minitab, Origin,TA Universal analyses, Spectrum, MestRenova, Orbit patent searcher and MS Office.

GRANTS AND AWARDS

- 2019- Postdoctoral scholarship, sponsored by Ministry of Science, Technology and Innovation of Colombia
- 2017- Honor Thesis granted in Ph.D in Engineering, Universidad del Valle (University of Valley) Colombia
- 2010- Ph.D. scholarship " Francisco José de Caldas Santander" sponsored by Ministry of Science, Technology and Innovation of Colombia
- 2010- Honor Thesis granted in Bachelor materials Engineering, Universidad del Valle (University of Valley) Colombia

PATENTS

- **Colombian Patent: NC2016/0005577** - Composite geopolymer refractory material and obtaining process through alkaline activation process of industrial and agro-industrial wastes. Status: Granted in May 10, 2018. Applicant: Universidad del Valle
- **US patent: 11214520 B1**- Mortar for Eco-masonry element. Status: Granted in January 4th, 2022. Applicant: Truce Global

JOURNAL PAPERS

- Mejía-Arcila, J., Valencia-Saavedra, W., Mejía de Gutiérrez, R., (2020). Eco-efficient alkaline activated binders for manufacturing blocks and pedestrian pavers with low carbon footprint: Mechanical properties and LCA assessment. *Materiales de Construcción* 70, e232.
- Johanna M. Mejía, Juan D. Mendoza, Jeison Yucuma, Ruby Mejía de Gutiérrez, Daniel E. Mejía, Myriam Astudillo, (2019). Mechanical, in-vitro biological and antimicrobial characterization as an evaluation protocol of a ceramic material based on alkaline activated metakaolin, *Applied Clay Science*, 178, 105141.
- Rafael Robayo-Salazar, Johanna Mejía-Arcila, Ruby Mejía de Gutiérrez, Edgar Martínez, (2018). Life cycle assessment (LCA) of an alkali-activated binary concrete based on natural volcanic pozzolan: A comparative analysis to OPC concrete. *Construction and Building Materials* 176, 103–111.
- Rafael Andres Robayo-Salazar, Johanna Mercedes Mejía-Arcila, Ruby Mejía de Gutiérrez. (2017), “Eco-efficient alkali-activated cement based on red clay brick wastes suitable for the manufacturing of building materials”, *Journal of Cleaner Production* 166, 242-252.
- Mejia, J.M., Mejia de Gutierrez, R., Montes, C. (2016) “Rice husk ash and spent diatomaceous earth as a source of silica to fabricate a geopolymeric binary binder”. *Journal of Cleaner Production*, 118, 133-139.
- J.M. Mejía, R. Mejía de Gutiérrez, F. Puertas, (2013), “Rice husk ash as a source of silica in alkali-activated fly ash and granulated blast furnace slag systems”, *Materiales de Construcción*, 63, 361-375.
- Johanna M. Mejía, Erich Rodríguez, Ruby Mejía de Gutiérrez, Nidia Gallego, (2015), “Hybrid alkaline cement based on a low-quality fly ash”, *Journal of Cleaner Production* 104, 346- 352.
- Johanna M. Mejía, Erich D. Rodríguez, Ruby Mejía De Gutiérrez, (2014), “Potential utilization of a low quality-fly ash as an aluminosilicate source in the production of geopolymers”, *Ingeniería y Universidad* 18, 309-327.
- Jhontahan Rivera, Johanna Mejia. Ruby Mejia, (2014), “Hybrid cement based on the alkali activation of by-products of coal” *Revista de la Construcción* 13, 31-39.
- C. Varga, M.M. Alonso, R. Mejía de Gutierrez, J. Mejía, F. Puertas, (2015), “Decalcification of alkali-activated slag pastes. Effect of the chemical composition of the slag”, *Materials and Structures* 48, 541–555.
- Carolina Martínez López, Johanna Mercedes Mejía Arcila, Janneth Torres Agredo, Ruby Mejía de Gutierrez, (2015), “Evaluation of the toxicity characteristics of two industrial wastes valorized by geopolymerization process”, *DYNA* 82, 74-81.
- Diego Vásquez-Molina, Johanna M. Mejía-Arcila, Ruby Mejía-de Gutiérrez, (2015), “Mechanical and thermal performance of a geopolymeric and hybrid material based on fly ash”, *DYNA* 83, 216-223.
- Carlos Montes, Kaylin Broussard, Matthew Gongre, Neven Simicevic, Johanna Mejia, Jessica Tham, Erez Allouche, Gabrielle Davis, (2015), “Evaluation of lunar regolith geopolymer binder as a radioactive shielding material for space exploration applications”, *Advances in Space Research* 56, 1212–1221.

CONFERENCE PAPERS

- Johanna M Mejia, William Gustavo Valencia, Ruby Mejia. (2016), “A binary binder to fabricate masonry Eco-blocks based on Colombian fly ashes, ground blast furnace slag and an agro- industrial by-product”, Conference: 6th

Amazon & Pacific Green Materials Congress and sustainable construction materials LAT- Rilem Conference, Cali-Colombia.

- Johanna Mercedes Mejia, Jhonathan Fernando Rivera, Ruby Mejia de Gutierrez, (2013), "Feasibility of use of a high percentage fly ash unburned material in alkaline activation processes", Conference: The International Conference on Solid Waste Technology and Management, Philadelphia-USA
- Johanna M. Mejia, Ruby Mejia de Gutierrez, Francisca Puertas, (2012), "Ceniza de cascarilla de arroz como fuente de sílice en sistemas cementicios de ceniza volante y escoria activados alcalinamente", Conference: IBRACON-54° Congresso Brasileiro do Concreto, Maceio- Brasil.
- C. Varga, M.M. Alonso, J. Mejía, R. Mejía de Gutierrez, F. Puertas, (2014), "Decalcification process in alkali activated slag pastes. influence of chemical composition of the slags", Conference: NTCC2014: International Conference on Non-Traditional Cement and Concrete, Madrid-Spain.