E R A•M I N 2

RESEARCH & INNOVATION PROGRAMME ON RAW MATERIALS
TO FOSTER CIRCULAR ECONOMY

ERA-MIN Joint Call 2015 Results:

Summary Reports

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Joint Call 2015 results: Summary Reports

Thirteen ERA-MIN funding agencies, **ADEME (France), ANR (France), DST (South Africa), FCT (Portugal), MINCYT (Argentina), MINECO (Spain), NCBR (Poland), OTKA (Hungary), SGU (Sweden), TEKES (Finland), TUBITAK (Turkey), UEFISCDI (Romania) and VINNOVA (Sweden),** committed together a total of €8 million of national/regional public funds to support their national/regional participants in the selected transnational R&D proposals submitted to the **third ERA-MIN Joint Call 2015.**

23 out of 27 full proposals were submitted in a complete form and involved a total of 124 participants. 20 passed the eligibility check. After evaluation and ranking, 6 transnational projects, involving 38 organisations, were finally selected for funding: project acronyms **BATRE-ARES, BIOCriticalMetals, CHARPHITE, COGITO-MIN, HITEM, REMinE**. The total project funding was €5.1 million, being the total costs of €6.04 million. The total success rate of the Joint Call 2015 was 26% (6 funded/23 submitted proposals).

The **scope** of this third Joint Call 2015 was needs driven research on **"Sustainable Supply of Raw Materials in Europe"** with the following main topic areas:

1. Primary resources,
2. Secondary resources (recycling),
3. Substitution of critical materials.

The sub-topics "Extraction", "Mine Closure and rehabilitation" and "Exploration" are the most addressed (*Figure 1*).

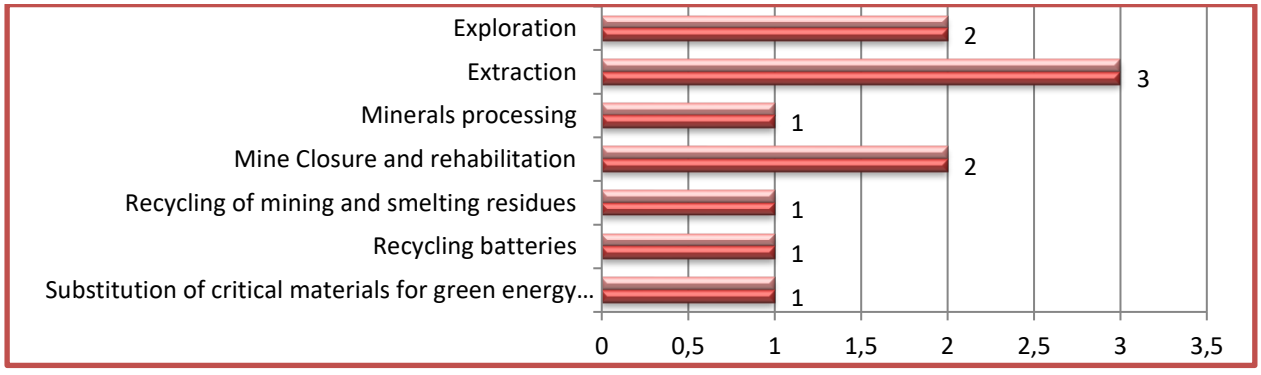


Figure 1 - Distribution of sub-topics addressed in the 6 funded projects.

The type of organisations with the highest participation in the 6 funded projects were public research organisation, representing 31%, and higher education institution with a participation of 30% (*Figure 2*).

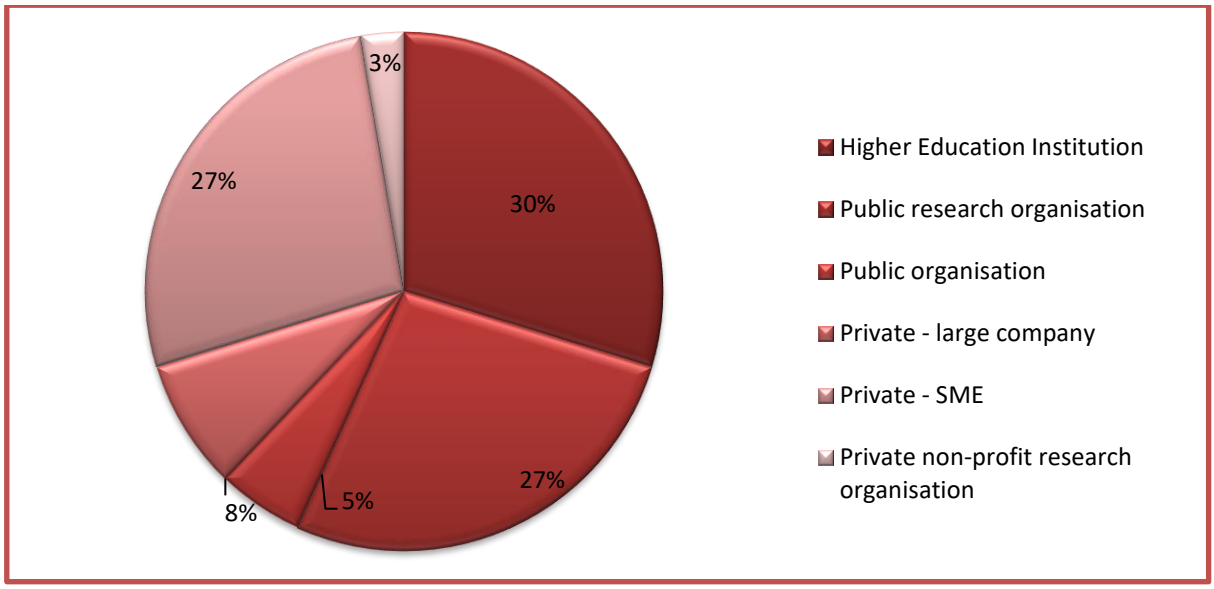


Figure 2 - Distribution of types of organisations in the 6 funded projects.

In terms of country participation, 8 out of 9 countries participating in this Joint Call funded at least two national/regional organisations of the 6 funded projects (*Figure 3*).

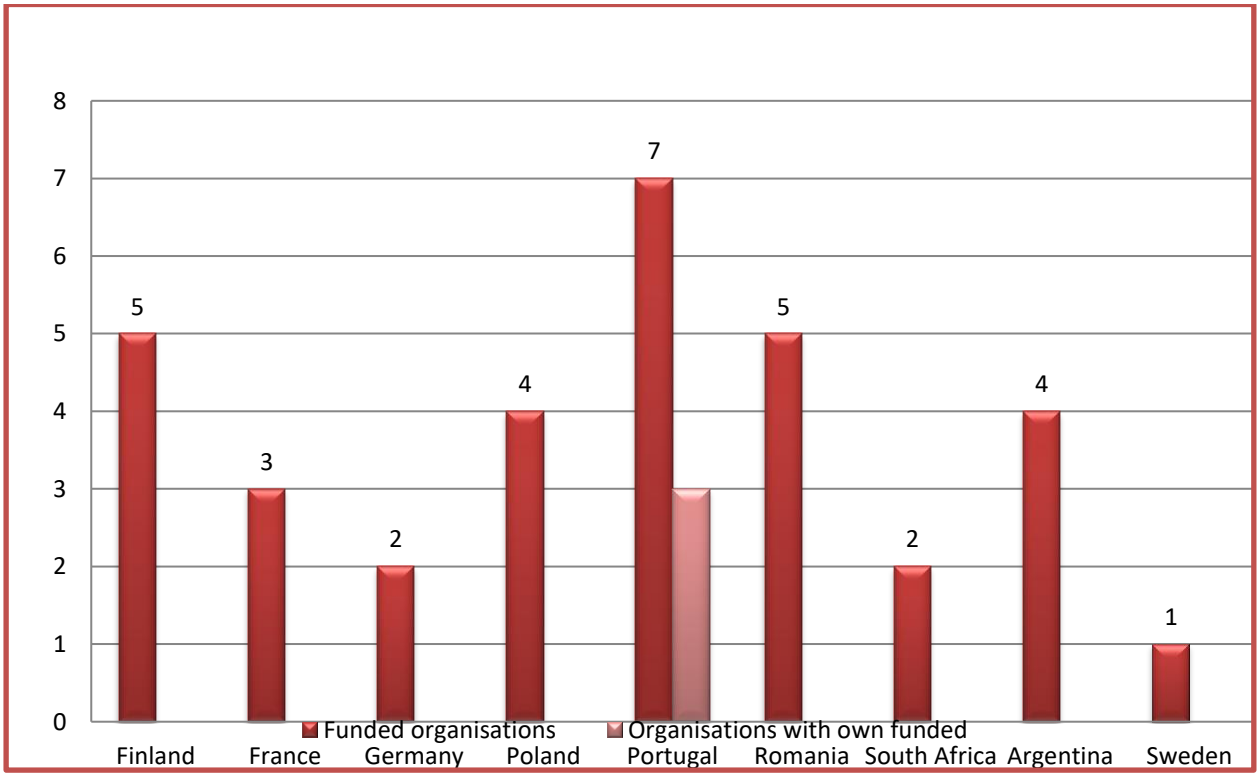


Figure 3 - Geographical participation in the 6 funded projects.

All funded projects involved 40 young researchers which represents the 27% of researchers participating in these projects (*Figure 4*).

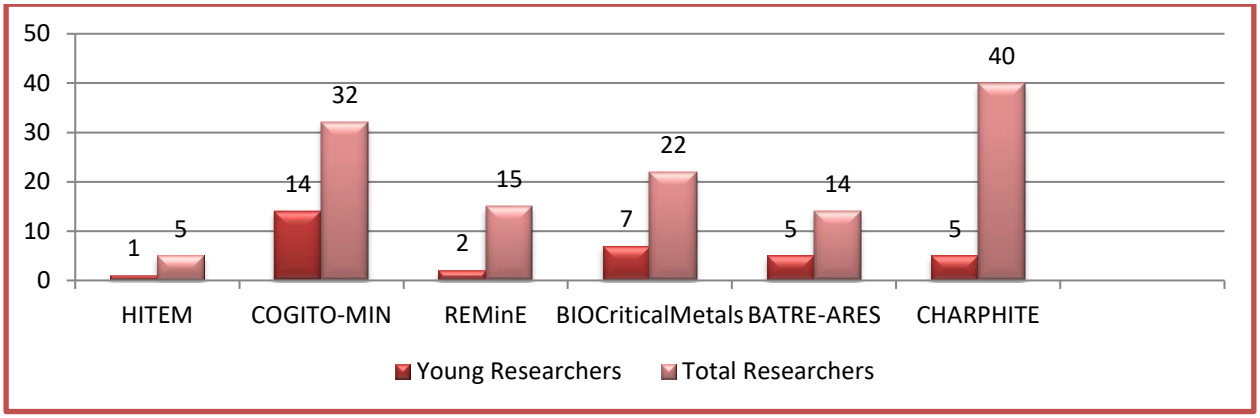


Figure 4 – Young and total researchers participating in the 6 funded projects.

It is highlighted mentioned that 50% of the researchers involved in these funded projects are female which represents a good indicative of gender balance (*Figure 5*).

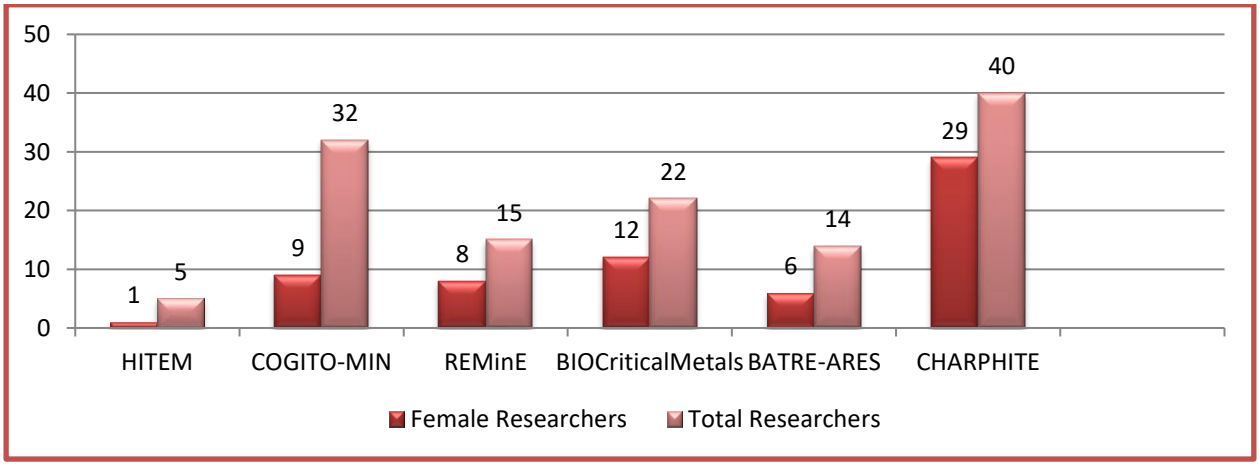


Figure 5 - Female and total researchers participating in the 6 funded projects.

These projects have produced 205 publications (Annex I), 1 patents/licenses & 3 thesis (Annex II) as well as created 1,5 permanent jobs and 40 temporary jobs.

New industrial collaborations have been created through the funded projects and the continuation of these collaborations have been strengthened, being very important the role developed by the industrial sector in the funded projects.

Project BATRE-ARES

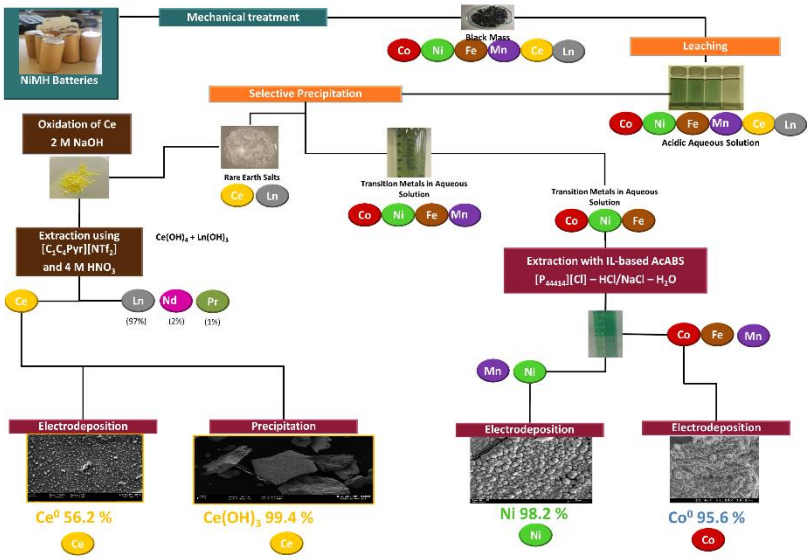
Battery Recycling – Achieving Rare Earth Separation

Sub-topic: 2.F – Metallurgical extraction;
2.G – Closing the loop from an integrated approach.
Project Coordinator: LEPMI (CNRS Délégation Alpes) (France)
Consortium partners:
University of Aveiro (Portugal); G-SCOP (France); Recupyl (France)

Project total funding: € 662.609
Project total costs: € 1.023.991
Duration: 40 months (2016-2019)

SUMMARY and RESULTS:

BatresAres project, supported by ERA-MIN network and co-financed by ADEME and FCT agencies, has proposed an innovative process flowsheet based on the use of ionic liquids for spent NiMH batteries recycling. Spent NiMH batteries contain important quantities of so-called critical raw materials (Co, Ni and REE) and could be thus considered as important source of these elements for EU industry. Two French and one Portuguese laboratories have been working together with one French industrial partner on the project.



Spent batteries have been at first ground and subjected to a first mechanical treatment in order to concentrate the valuable elements in the so-called black mass. This black mass was then leached by diluted sulfuric acid at room temperature and after an additional precipitation step, REE were selectively and quantitatively separated from transition metals (Co, Ni and Mn).

The obtained precipitate was, after an additional oxidation step carried out under alkaline condition, dissolved in nitric acid solution and cerium was selectively separated by extraction from other REE using a specific hydrophobic ionic liquid. A quantitative back-extraction then allowed its selective recovery. Other REE were then recovered in mixture by precipitation.

Very innovative alternative was then thoroughly studied for the transition metals selective recovery. The so-called acid aqueous biphasic systems based on hydrophilic and inorganic acid mixture which splits into two immiscible phases under appropriate concentration of both elements have been described and investigated. Upon splitting an ionic liquid rich phase and an acid rich phase are obtained and the studied metals partition selectively between the two phases. It was proved that Ni can thus be selectively separated from Co. Both elements can then be recovered by electrodeposition.

Finally, an environmental impact assessment of the developed recycling scenario has been carried out using Life Cycle Assessment (LCA) methodology. Using LCA results, it was possible to identify the hotspots activities (most impacting activities) and to quantify the contribution of the recycling process configuration parameters in order to support decision making for the more appropriate recycling strategy. These are namely waste flows treatment, energy consumption and the number of reuse cycles of the used ionic liquids.

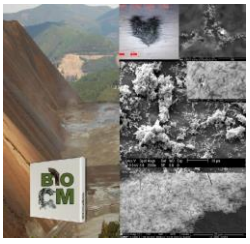
Project BIOCriticalMetals

Recognition of microbial functional communities and assessment of the mineralizing potential (bioleaching) for hightech critical metals

Sub-topic: 1.B - Extraction, 1.E - Mine closure and rehabilitation; 2.A - Recycling of mining and smelting residues (incl. historical dumps and tailings)
Project Coordinator: University of Coimbra (Portugal)
Consortium partners: University of Porto (Portugal), IMNR (Romania), INCDBS (Romania), Universidad Nacional de San Luis (Argentina), EDM (Portugal), Beralt Tin & Wolfram S.A.(Portugal), Geoplano S.A.(Portugal), G.T INGENIERIA S.A. (Argentina), Direction de Mineria de la Provincia de San Luis (Argentina), Comision Nacional de Energia Atomica (Argentina).

Project total funding: € 549.694
Project total costs: € 573.267
Duration: 36 months (2016-2019)
Website:
http://www.uc.pt/en/org/biocriticalmetals

SUMMARY and RESULTS:



The cutting-edge innovative approach of combining microorganisms having the potential to be used in the extraction of metals, with methods (bio & nano) to adsorb these metals was the aim of BIOCriticalMetals. The project, through the contact with stakeholders and industrial partners, made available the methodology developed in the lab to the future exploitation of tailings where potentially critical high-tech metals exist and also to primary sources of these metals, boosting the efficiency of existing mines and expanding the feasibility of the exploitation of small ore deposits.

Definition and characterization of the sample areas (WP1): The objective was to sample and characterize mine waste tailings at the chemical and microbiological level and isolate microorganisms from tungsten and massive sulfide deposits from different climate contexts. The mines selected in Portugal were Panasqueira mine (W and Sn, active, Beraltin&W) and Jales (closed, EDM), in Romania the mines suggested by National Agency for Mineral Resources (ANRM) and General Direction for Mineral Resources and Sustainable Development of Industrial Zones Bălan (county Harghita), Săsar Vechi, Bozânta, Bloaja Vechi, Leorda (county Maramureș), Fagetul Ierii, Baisoara (county Cluj), Fanate (county Bihor), Valea Sesei (county Alba), Valea Mealu (county Hunedoara), Sasca Montana (county Caras Severin) and in Argentina La Carolina mine. The sediments from the target tailings were analysed by ICP and the microbiome of Panasqueira and La Carolina determined by Illumina sequencing. The bacterial isolates were included in UCCCB and NIRDBS culture collections. The deliverables 1.1., 1.2 and 1.3 are included in the publications.

Assessment of the capability of microorganism for bioprocessing critical metals (WP2): The objective was to assess the bioleaching process using microorganisms to mobilize critical metals (tungsten, W; indium, In; gallium, Ga; tellurium, Te; molybdenum, Mo) from mine waste tailings for further processing. Isolates from Panasqueira and La Carolina mines presenting a high tolerance to target metals were selected for bioleaching tests at a small scale. The leaching conditions were optimized by varying the pH, temperature and carbon source. The effect of the presence of a biological consortium on bioleaching ability was also evaluated. The leachates were analyzed by ICP-MS to quantify all the elements released and not only the target metals (by-products). Deliverables 2.1. and 2.2. were fulfilled: identified 1 bacterial able to leach Ga (Rhodanobacter sp. strain B2A1Ga4) 2 strains able to leach Te (Bacillus; Paneabicillus), 1 strain able to leach W (Bacillus 5W24). Siderophores (hydroxamate) were found to be the effector molecules for leaching in that strain (deliverable 2.3). Bioleaching at small scale was demonstrated except for Indium. All results were presented in congresses as oral and poster presentations. The results are also included in publications.

Bioaccumulation strategies with bacteria for leachate treatment (WP3): The objective was to screen metal resistance microorganisms for their ability to accumulate specific metals (W, In, Ga, Te, and Mo) inside the cells and to characterize their accumulative binding capacities. Here was constructed a W hiperaccumulator – EcotupW - using the tup genetic determinants from Sulfitobacter dubius. EcotupW selectively accumulates W in the presence of Mo and Cr. The Bacillus mycoides AlJ98 was showed the accumulate selectively Te in high amounts. Tsukamurella strain B2A2 0.5Te-1 exhibited accumulation of Ga. Mycolicibacterium strain Jales 666 showed high accumulation of In. The genome of the selected organisms was sequenced and is available. Deliverable 3.1 was achieved with the construction of a highly efficient W accumulator (EcotupW); 3.2 (bioaccumulators) were achieved for W, Te, Mo. Deliverable 3.3. was achieved for W and Te genetic determinants. All results were presented at congresses and published in high impact journals.

Development of experimental reactors for selected cases focused on the use of microbial consortiums (WP4): The objective of this WP was to test, at different scales, a selected group of organisms and processes selected considering the results of WP3. The selected strains were used to leach the Panasqueira tailings and the Romania tailings from Bonzanta and Fânate. The upscale of the leaching experiments was performed with fix bead columns. The bioleaching dynamic showed that pore water had 10x more metal concentration than percolating water. The concept for biological extraction of metals from tailings was proposed associating bioleaching and negative pressure extraction of the leachate. The deliverables 4.1. and 4.2 were presented at 2 congresses. The concept for metal removal from sediments include (deliverable 4.3) bioaugmentation with autochthonous microorganisms and negative pressure to obtain pore water.

Assess the wastes produced by bioleaching and mixed (bio-nano) treatment (WP5): The objective was to assess the geochemical composition of the solid wastes obtained from WP2 and the chemical composition of the leaching liquid from the wastes produced after metal recovery in WP3. XRD determined composition of the sediments after bioleaching were obtained from Romanian mine sediments of Fânate. The bioleachate composition of Panasqueira mine tailings using different bacterial strains was determined by IP-MS. The leachates were rich in Cu and Zn and low in W. The characterization of the sediments and solutions after bioleaching (deliverables 5.1 and 5.2) were determined for all the experiments and can be assess in a database. The deliverable 5.3 was not achieved.

Synthesis, communication, coordination (WP6): The objectives were to create the necessary governance structure for an effective implementation and management. All deliverables were achieved and we consider that at least in Portugal the project had high impact in the company Beraltin. All information is available at the Website (https://www.researchgate.net/project/EU-H2020-ERA-MIN-2-BIOCriticalMetals).

Project CHARPHITE

Coal char as a substituting material of natural graphite in green energy technologies

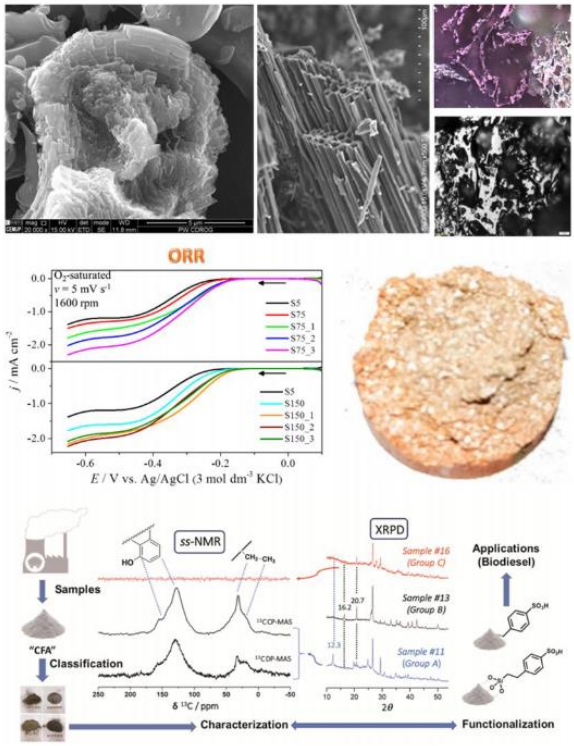
Sub-topic: Extraction, Minerals processing, Mine closure and rehabilitation, Recycling of mining and smelting residues (incl. historical dumps and tailings)

Project Coordinator: University of Porto (Portugal)

Project total funding: € 1.822.371
Project total costs: € 2.481.175
Duration: 45 months (2016-2019)

Consortium partners: University Politehnica Buchares (Romania); REQUIMTE (Portugal); UBA & CONICET (Argentina); University "Constantin Brancusi" of Targu Jiu (Romania); CENTRAL MINING INSTITUTE (Poland); CARBO-GRAF SP. Z O.O. (Poland); University of Johannesburg (South Africa); Pegop–Energia Eléctrica, S.A. (Portugal)

SUMMARY and RESULTS:



The project aimed to demonstrate the technical feasibility to utilize coalCHAR recycled from fly ash andbottom ash as a substitute for graphite-based materials for applications as catalysts in electro-assistedreactions for sustainable energy production: oxygen reduction reaction (ORR) for fuel cell technologyand water splitting.Coal combustion ash samples from Portugal, Poland, Romania and South Africa were selected todetermine a suitable separation procedure. Following ash characterization, the chars were extractedusing several combinations of particle size, elutriation electrostatic, and magnetic separation steps. Thefinal product grade was up to 75 wt. % carbon. The anisotropy percentages of the samples rangedbetween 22 and 49 %; the reference natural graphite sample had anisotropy of 86 %, and Ramanmicrospectroscopyclassified the char concentrates as being "transitional" with the possibility as aprecursor for synthetic graphite.

Fly ash samples from different sources and size fractions were selected to prepare solid acid catalysts tobe used in the transformation ofbiomass derivatives into fuel additives and biofuels production,including esterification of levulinic acid for the preparation of n-butyl levulinate. n-Butyl levulinate wasunique product with conversions up to 100 % after 40 min. reaction. The most promising catalyststudied also exhibited the highest TOFs (447 h-1) and showed to be the most stable and reusable for 5consecutive catalytic cycles. The 13C ss-NMR experiment shows all the expected carbon resonancesignals according to the chemical modification performed. The use of CFA from different sources anddifferent particles sizes endeavor to evaluate the potential effect of: i) different particle sizes; ii) metaloxides composition and carbon content in the final functionalization and catalytic esterification activity. For the electrocatalytic studies, each fly ash was separated by size-25, 45, 75 and 150 um–and testedfor the ORR. All samples showed a dependency between the ORR electrocatalytic activity and theparticles size/composition.For char concentrates, demineralized char concentrates and graphitized char concentrates, in N2-saturated electrolyte, no electrochemical processes are observed for all the samples tested, includinggraphene flakes (GF) whereas, in the presence of O2, all samplesshowed an irreversible reduction peakat 0.63≥Epc≥ 0.75 corresponding to the reduction of oxygen. For the set of concentrated and furthercarbonized samples two samples showed number of electrons transferred per O2 molecules withñ= 2.7and 2.8, suggesting a mix 2-/4-electron pathway.For concentrated and demineralized chars followed by graphitization, the best result was ñ of 3.0 eventhough lowerjLandEonsetvalues were obtained. The electrocatalytic results obtained show that theproject goal touse chars derived from coal fly ash and coal bottom ash as a substitute for graphite-based materials in green energy applications was achieved, and all materials were successfully used inthe electro-assisted energy reaction–oxygen reduction reaction (ORR).Preliminary tests to assess future work were made using laboratory technology of CHAR carbonizationrecovered from the low rank coals and laboratory technology of CHAR pre-graphitization in microwavefield from high rank coals.Tests were made on inorganic residues left for both lightweight construction materials, as well as forhydraulic or ceramic bonding, for different types of by-products and the results were promising, thuscontributing to sustainable waste management and zero waste directives.

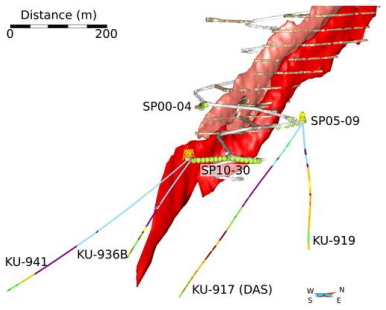
Project COGITO-MIN

COst-effective Geophysical Imaging Techniques for supporting Ongoing MINeral exploration in Europe

Sub-topic: Sustainable Supply of Raw Materials in Europe.
1.A - Exploration, 1.B - Extraction
Project Coordinator: UH (Finland)
Consortium partners: IG PAS (Poland); GTK (Finland); Vibrometric Oy (Finland); Boliden FinnEx Oy (Finland); GP (Poland)

Project total funding: € 1.143.856
Project total costs: € 1.881.110
Duration: 36 months (2016-2018)
Website: https://www.cogito-min.eu

SUMMARY and RESULTS:



The overall aim of COGITO-MIN was to develop cost-effective geophysical mineral exploration techniques, with new advances in particular in data acquisition, processing and interpretation of passive and active-source surface and borehole seismic data (Koivisto et al. 2016, 2018). In 2016, COGITO-MIN acquired an extensive seismic dataset in the Kylylahti sulphide mine and exploration area in Finland. The COGITO-MIN experiments included (i) a 3D passive seismic survey in which ~1000 receivers in a 3.5 x 3 km grid were left to record ambient noise sources for 30 days (Chamarczuk et al. 2018, 2019), (ii) two approximately 6-km long high-resolution seismic reflection 2D profiles (Heinonen et al. 2019), (iii) a sparse active-source 3D seismic reflection survey utilizing the passive seismic grid and a "random" distribution of Vibroseis and explosive sources (Singh et al. 2019), and (iv) a multi-azimuth walk-away three-component Vertical Seismic Profiling (VSP) survey in three boreholes starting from the mine tunnels, with one borehole instrumented also with fibre-optic Distributed Acoustic Sensing (DAS) technology (Riedel et al. 2018) in collaboration with Silixa. The experiments were designed with different stages of the exploration workflow in mind; from mapping of the ore host rocks at larger scale to high-resolution near-mine and in-mine exploration. Seismic surveys were supported by petrophysical measurements (Luhta 2019) that provide constraints for interpretation of the dataset.

High-resolution 2D reflection profiles confirmed the depth-extent of the Outokumpu assemblage rocks that host the mineralizations in the Kylylahti area. These rocks manifest themselves in form of increased piecewise reflectivity, which provides interesting targets for further investigations (Heinonen et al. 2018). A specialized pre-stack depth imaging (Hlousek et al. 2015) was tested in co-operation with TU Bergakademie Freiberg. This so called Fresnel Volume Migration outperformed a more traditional time imaging approach, especially in imaging shallow steeply dipping contacts. Heinonen et al (2019) demonstrated that seismic reflection profiling combined with this type of depth imaging can be a powerful tool even when source access is limited, encouraging more frequent, cost-effective seismic mineral exploration efforts also in greenfield areas. Sparse and irregular active-source 3D survey provided new details about the architecture of the Kylylahti area, in particular about the spatial extent of the Outokumpu assemblage rocks. Similar to 2D imaging, a significant uplift in imaging was brought by the pre-stack depth imaging (Singh et al. 2019). The results show that a sparse 3D active-source survey is a viable, cost-effective option when a full active-source 3D survey is not possible. VSP results, involving development of a VSP imaging scheme corroborated by detailed forward modelling and interpretation workflow, led to successful interpretation of key geological contacts including the target sulphide mineralization (Riedel et al. 2018). The results demonstrate the value of tailored in-mine VSP measurements for in-mine exploration and resource delineation in a complex geological setting, especially when coupled with the fiber-optic DAS technology which provides reflection data of sufficient quality with less logistical efforts. To our knowledge this was the first time that DAS technology was tested in a crystalline rock mining environment. The VSP data acquisition and processing workflows can be readily applied to new sites and are offered as a commercial service by Vibrometric.
Within COGITO-MIN project, also a new software was tested by Geopartner for joint inversion of 2D gravity and audio-magnetotelluric (AMT) data. The tests provided new information for developing the software. However, in the Kylylahti-type geological environment a 3D magnetotelluric survey would be more applicable. The COGITO-MIN seismic data successfully delineate the main geological contacts in the Kylylahti area. The COGITO-MIN dataset is jointly interpreted with other geological and geophysical data, e.g. AMT data and earlier 2D reflection seismic profiles from the area, to construct a 3D model of the main geological contacts. Tests are being run to parameterize and integrate seismic data into an exploration workflow.

Project HITEM

Highly sensitive receiver for measuring transient electromagnetic responses in Exploration for deep buried mineral occurrences

Sub-topic: Primary resources: exploration, extraction, minerals processing, metallurgy, mine closure and rehabilitation. 1.A –Exploration.

Project Coordinator: SUP (Germany)

Consortium partners:
BBG (South Africa); Leibniz IPHT (Germany); GRM - SMOY (Finland)

Project total funding: € 969.611
Project total costs: € 1.152.069
Duration: 41 months (2016-2019)

SUMMARY and RESULTS:

The potential for exploring resource deposits deeper than 500m from the surface is limited by geophysical techniques. One method successfully applied to date is so-called transient, time domain or pulse electro-magnetics (TEM). For volcanogenic massive sulphide deposits (VMS as a subspecies of volcanic exhalative deposits), conventional measurement techniques have already been able to achieve exploration depths of up to a few hundred metres. In addition to non-ferrous metals, these VMS deposits usually also contain significant amounts of platinum and platinum group elements, including platinum, palladium, ruthenium, iridium, rhodium and osmium. All of them contain valuable high-tech metals, which are necessary for future technologies.

Electromagnetic exploration methods, such as TEM, are excellently suited for this type of deposit, as the metals have an increased electrical conductivity. Due to the previous limitation of the exploration depth, however, very little is known about the depth extension of the deposits. This applies in particular to Germany, where after centuries of intensive mining, superficial resources are considered to be exhausted as far as possible.In thisproject, the researchers have advanced this technology in order to enable extended penetration depths and to explore VMS deposits for the acquisition of high-tech metals. In the "HiTEM" project, a higher penetration depth of the method was not achieved byincreasing the transmitter pulse moment, but by increasing the sensitivity of the sensors and the entire TEM receiver, particularly in the low-frequency range. This enabled to make use of later times in the TEM signal decay after the transmitter pulse hasbeen switched off. This task was solved by means of new Superconducting Quantum Interference Detectors (SQUID) based on high-temperature superconducting (HTS) materials. The development of robust, low-noise HTS-SQUID sensors was part of the work of Leibniz IPHT and was successfully realised. The new sensors are faster to be fabricated, can be assembled and encapsulated in fewer processing steps as well as they are more robust in operation which makes them more cost-effective. For this purpose, new fabrication tools and technologies were implemented in the fabrication line. The performance of the sensors wascharacterized by the advanced and adapted receiver electronics. For the first time, control electronics based onhigh-frequency AC Bias were developed and implemented for all three sensors. In the interaction of sensors and electronics, the system noise could be reduced, especially in the low-frequency frequency range, thus achieving a high signal quality and a greater depth of investigation. The control electronicsand all indicators arenow fully digitaland transferred to a browser-based solution, so that now no complex installation of additional software for setting the systems and system parameters is necessary. The field tests in Finland and possibly other countries on representative targets of this deposit type are to be completed in this year. Initial results on the improved system parameters have already been determined and validated. Within the scope of further field measurements, these results will be verified in the field (Finland) and the developed innovativemethods for the reduction of electromagnetic noise in the corresponding frequency range for TEM will be analysed, validated and optimized. In addition, new inversion and interpretation methods could be further developed and implemented. Due to different aspects the project had been prolonged by 6 monthsand ended in October 2019.The project results prove that the expectations of the partners involved were fulfilled. Against this background, SUPRACONbelieves that a new, robust technology has been developed that will enable exploration service providers and mining companies to make more accurate statements about potential deposits. This might be accompanied by a potential reduction in the number of drill holes required, as the expected deposits can be determined more accurately.

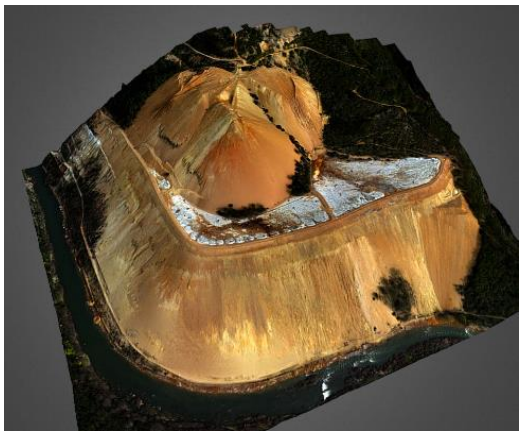
Project REMinE

Improve Resource Efficiency and Minimize Environmental Footprint

Sub-topic: Extraction, Mine closure and rehabilitation, Minerals processing
Project Coordinator: LTU (Sweden)
Consortium partners:
INCDMRR (Romania); FEUP (Portugal)

Project total funding: € 871.056
Project total costs: € 1.021.207
Duration: 36 months (2016-2019)

SUMMARY and RESULTS:



The REMinE project is organized in five work packages (see section 2) that comprise: project management (WP1), detailed characterization of the mining wastes selected (WP2), identification of new processing methods for treating ancient tailings (WP3), characterization and risk assessment of the tailings and neo-tailings (WP4), outlining business opportunities and environmental impact in a conceptual model for sustainable mining (WP5).
The project comprises case studies of historical mine wastes from three different European countries, namely Portugal, Romania and Sweden.
The interdisciplinary research collaboration in this project is innovative in the sense that separation of minerals and extraction of metals are based not only on technical and economic profit but also consider the environmental perspective. This might lead to an understanding that environmental benefits and social responsibility should be of equal importance in comparison with economic feasibility. The project includes detailed characterization and risk assessment of the wastes, identification of new processing methods and process design, outlining of business possibilities, and a risk assessment for the remaining residuals. The main results will lead to a conceptual model as guidance for the further sustainable development of mining. Main achievements FEUP: Extensive sampling of the tailings disposal allowing its mineralogical, physical, chemical, and environmental characterization; construction of 3-D geo-referenced model of the tailings embankment; flowsheet for an integrated processing of the tailings that includes removal of arsenic by flotation and recovery of tungsten and zinc by hydrometallurgical methods; quantitative environmental and toxicological risk assessment; proposal of a methodology for optimizing a multi-criteria solution. Main achievements LTU: High content of Be, Bi, Cu, Sn, W, Zn, F and S in the were found in the Yxsjöberg tailings, Sweden. Long-term storage in ambient conditions has generated a oxidized environment which is characterized by complete oxidation of pyrrhotite, depletion of calcite, decreased pH from >8 to <4,weathering of fluorite and small parts of silicates, and formations of secondary gypsum and amorphous hydrous ferric oxides. The release of elements from the tailings have decreased the quality of surface water downstream the tailings. The most critical major element was F, which was found in concentrations (2.6 mg/L) that can have moderate to severe effects on humans. Trace elements of high potential concern to leach out with the mine drainage is Be and Zn. Tungsten was released to the groundwater of the tailings and into surface water downstream the tailings. However ,the concentrations were not large enough to be classified as a contaminant according to today's water regulations. Drill cores taken from the tailings deposit were classified according to their mineralogical and processing properties. Based on metallurgical test work a flowsheet has been developed that involves enhanced physical separation and flotation. Product streams were analysed with respect to multiple objectives as recovery of valuable minerals and environmental risk from new tailings. Main achievements INCDMRR: The tailings showed high potential of acid releases. The processing of the tailings by flotations allows to concentrate more than 70% of the arsenic. Besides that, the depressed material is enriched in tungsten with lower arsenic content allowing for its recovery. The technical aspect of tailings reprocessing was done by multi-objective parametric optimization (W and Zn grades and recoveries) based on mathematical models and processing laboratory results for flotation and leaching.

ANNEX I:

❖ Project BATRE-ARES:

Title	Link (doi or similar)
Article 1: Nicolas Schaeffer, Matthieu Gras, Helena Passos, Vijetha Mogilireddy, Carlos M. N Mendonça Eduarda Pereira, Eric Chainet, Isabelle Billard, João A. P. Coutinho, and Nicolas Papaiconomou; "Synergistic aqueous biphasic systems: a new paradigm for the 'onepot' extraction of critical metals", ACS Sustainable Chemistry and Engineering, 2019, 7, 1769-1777	https://doi.org/10.1021/acssuschemeng.8b05754
Article 2: Nicolas Schaeffer, German Pérez-Sánchez, Helena Passos, José R.B. Gomes, Nicolas Papaiconomou, João A. P. Coutinho; "Mechanisms of Phase Separation in Temperature–Responsive Acidic Aqueous Biphasic Systems", Physical Chemistry Chemical Physics, 2019,21, 7462-7473	https://doi.org/10.1039/C8CP07750A
Article 3: Matthieu Gras, Nicolas Papaiconomou, Nicolas Schaeffer, Eric Chainet, Farouk Tedjar, João A. P. Coutinho, Isabelle Billard; "Ionic-Liquid-Based Acidic Aqueous Biphasic Systems for Simultaneous Leaching and Extraction of Metallic Ions", Angewandte Chemie, 2018, 57, 1563-1566.	https://doi.org/10.1002/anie.201711068
Article 4: Nicolas Schaeffer, Helena Passos, Matthieu Gras, Vijetha Mogilireddy, João P Leal, German Perez-Sanchez, José R. B. Gomes, Isabelle Billard, Nicolas Papaiconomou, and João A. P. Coutinho; "Mechanism of ionic liquid-based acidic aqueous biphasic systems formation", Physical Chemistry Chemical Physics, 2018, 20, 9838-9846.	https://doi.org/10.1039/C8CP00937F
Article 5: Vijetha Mogilireddy, Matthieu Gras, Nicolas Schaeffer, Helena Passos, Lenka Svecova, Nicolas Papaiconomou, João A. P. Coutinho, and Isabelle Billard; "Understanding the fundamentals of acid-induced ionic liquid-based aqueous biphasic system", Physical Chemistry Chemical Physics, 2018, 20, 16477-16484.	https://doi.org/10.1039/C8CP02862A
Article 6: Nicolas Schaeffer, Helena Passos, Isabelle Billard, Nicolas Papaiconomou, and João A. P. Coutinho; "Recovery of metals from waste electrical and electronic equipment (WEEE) using unconventional solvents based on ionic liquids", Critical Review in Environmental Science and Technology, 2018.	https://doi.org/10.1080/10643389.2018.1477417
Article 7: Matthieu Gras, Nicolas Papaiconomou, Eric Chaînet, Farouk Tedjar, Isabelle Billard, Separation of cerium (III) from lanthanum (III), neodymium (III) and praseodymium (III) by oxidation and liquid-liquid extraction using ionic liquids Separation and Purification Technology, 178 (2017) 169-177.	https://doi.org/10.1016/j.seppur.2017.01.035

❖ Project BIOCriticalMetals:

Title	Link (doi or similar)
Master thesis of Francisco Vieira in Master in Geology of from Department of Earth Science, Faculty of Sciences and Technology, University of Coimbra in 2017.	https://eg.uc.pt/handle/10316/15518
Master thesis of Márcia Ansiães in Master of Applied Ecology from Department of Life Sciences, Faculty of Sciences and Technology, University of Coimbra entitled "Tungsten bioaccumulation trough bacterial utilization: development and optimization of tungsten absorbent and/or tungsten chelating bacteria", in 2018.	https://eg.uc.pt/handle/10316/15518
Master thesis of Joana Caldeira in Biochemistry Master from Department of Life Sciences, Faculty of Sciences and Technology, University of Coimbra entitled "Biological Mechanisms for the Control of Oxidative Stress Induced by Critical Metals in Bacteria", in 2018.	https://eg.uc.pt/handle/10316/15518
Master thesis of Merijn Moens in International Master of Applied Ecology (IMAE) from Department of Life Sciences, Faculty of Sciences and Technology, University of Coimbra entitled "Ochrobactrum tritici immobilized in Oryza sativa, sodium polyacrylate and alginate as a novel bioremediation tool", in 2017.	https://eg.uc.pt/handle/10316/15518
Fonseca, F.R.M.2017. Master thesis in Biomedical Engineering, Specialty Biomaterials and Medical Instrumentation: "3D Printing of nanocomposites: bacteria as raw material providers"	https://eg.uc.pt/handle/10316/15518
Francisca Barbosa Brás (2017). "Estudo da aptidão de microrganismos autóctones de ambientes mineiros na recuperação de metais críticos", Master Dissertation in Mining and Geo-environment Engineering, Faculdade de Engenharia da Universidade do Porto.	http://hdl.handle.net/10216/108303
Giuditta Romio, Flask and Column Bioleaching Tests by Autochthonous Microbial Community for the Recovery of Heavy Metals from Mining Waste, Dissertation submitted for the degree of MASTER IN ENVIRONMENTAL ENGINEERING.	https://drive.google.com/open?id=1f8q6SS1YcBlPAbfDBOlimDwSuH3X2h-o
Ph.D. thesis of Pedro Farias in Biosciences from Department of Life Sciences, Faculty of Sciences and Technology, University of Coimbra entitled "New bacterial strategies for Tellurium bioleaching and high value nanoparticle production", in 2016. (ongoing).	*(ongoing)*
Chung, A.P., Coimbra, C., Farias, P. et al. Tailings microbial community profile and prediction of its functionality in basins of tungsten mine. Sci Rep 9, 19596 (2019).	https://doi.org/10.1038/s41598-019-55706-6
Piedade, A.P. & P.V. Morais. (2017) Biomachining of stainless steel: characterization by microscopic techniques. In Microscopy and imaging science: practical approaches to applied research and education (Microscopy Book Series - Volume #7, 410-416). A. Méndez-Vilas (Ed).	*Formatex Research Center, ISBN-13: 978-84-942134-9-6, February 2017*
Piedade, A., Francisco, R., Branco, R., and P.V. Morais. 2018. Thin films for medical and environmental applications (Chapter), pp 1-13. In: Thin Film Synthesis and Application for Medical and Biological Use.	*IntechOpen. ISBN 978-953-51-6670-2*
Coimbra C., Branco R., Morais P.V. Efficient bioaccumulation of tungsten by Escherichia coli cells expressing the Sulfitobacter dubius TupBCA system. Systematic and Applied Microbiology 42 (2019) 126001.	https://doi.org/10.1016/j.syapm.2019.126001
Coimbra, C., Farias, P., Branco, R., and Morais, .V. (2017) Tungsten accumulation by highly resistant marine hydrothermal Sulfitobacter dubius strains carrying a tupBCA cluster. Syst. Appl. Microbiol. 40: 388 395.	*doi: 10.1016/j.syapm.2017.06.005*
Francisco, R., Branco, R., Schwab, S., Baldani, I., and Morais, P.V. Impact of plant-associated bacteria biosensors on plant growth in the presence of hexavalent chromium. World J Microbiol Biotechnol 34, 12 (2018).	https://doi.org/10.1007/s11274-017-2389-0

Francisco, R., Branco, R., Schwab, S., Baldani, I., and Morais, P.V. Two plant-hosted whole-cell bacterial biosensors for detection of bioavailable Cr(VI). World J Microbiol Biotechnol 35, 129 (2019).	https://doi.org/10.1007/s11274-019-2703-0
Morais, P.V., M. Moens e S. Dias. 2018. Ensino de microbiologia no ensino básico, através do desenvolvimento de um projeto de investigação em biorremediação. Conexão Ciência (Online).	https://periodicos.uniformg.edu.br:21011/ojs/index.php/conexaociencia/article/view/945
PV Morais. (2017) Bio-based waste could secure the future. Impact Communicating research. pp. 47-49.	
Proença DN, Heine T, Morais P.V., Tischler D. 2018. Link between genomic identification and biochemical characterization of novel siderophores produced by endophytic bacteria. In Grenni P., Fernández-López M., Mercado-Blanco J. (Eds). Soil biodiversity and European woody agroecosystem.	*COST Action FP1305 BioLink Linking belowground biodiversity and ecosystem function in European forests, Proceedings of the 2018 Annual Meeting. Granada.*
Morais, P.V., R. Francisco e R. Branco. 2017. A biorremediação na recuperação de solos. Economia Circular em Geotecnia Ambiental, workshop 22 novembro, DEC-UC Coimbra, Portugal. Ebook. Pp.40-42.	http://www.spgeotecnia.pt/cpga/content.asp?startAt=2&categoryID=1108&newsID=3613
Proença, D. N., Heine, T., Senges, C. H. R., Bandow, J. E., Morais, P. V., & Tischler, D. (2019). Bacterial metabolites produced under iron limitation kill pinewood nematode and attract Caenorhabditis elegans. Frontiers in Microbiology, 10, 2166.	https://doi.org/10.3389/fmicb.2019.02166
Almeida M C, Branco R and Morais P V. 2020. Response to vanadate exposure in Ochrobactrum tritici strains . PLoS ONE 15(2): e0229359.	https://doi.org/10.1371/journal.pone.0229359
Moens M, Branco R and Morais P V. 2020. Arsenic accumulation by a rhizosphere bacterial strain Ochrobactrum tritici reduces rice plant arsenic levels . World Journal of Microbiology and Biotechnology 36, 23.	https://doi.org/10.1007/s11274-020-2800-0
M. Cristina Vila; Diana Madureira; Olga Nunes; Rita Lopes; Sílvia Santos; Aurora Futuro; M. Lurdes Dinis; António Fiúza. (2018). "Cadmium and Arsenic removal from Panasqueira mine tailings by a microbial consortium" Biohydrometallurgy'18.	http://www.mineng.com/biotechnology/bookstore/16.htm
Marian BUTU, Steliana RODINO, Alina BUTU, Critical Metals Recovery Using Biotechnological Methods, Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj Napoca. Animal Science and Biotechnologies, v vol. 73, no 2, 212 217, 2016.	https://journals.usamvcluj.ro/index.php/zootehnie/article/view/12252
A. BUTU, S. RODINO, A. DOBRE, M. BUTU, Potential of microbial functional communities for high tech critical metals recovery, Studia Universitatis Vasile Goldis, Seria Stiintele Vietii, vol 26 (2), 293 297, 2016.	http://www.studiauniversitatis.ro/?p=645
S. RODINO, A. BUTU, G. FIDLER, M. BUTU, Preliminary screening of bacterial isolates from mining wastes, Studia Universitatis Vasile Goldis, Seria Stiintele Vietii, vol 26 (2), 287 292, 2016.	www.studiauniversitatis.ro/?p=643
Marian BUTU, Steliana RODINO, Alina BUTU, Screening of microorganisms for the recovery of critical metals, Book of abstracts,12th edition of the National Symposium with International Participation MEDICINAL PLANTS PRESENT AND PERSPECTIVES", 50 51, 2016.	http://www.bio.uaic.ro/publicatii/analele_vegetala/issue/2016F1/012016F1.pdf
Alina BUȚU, Marian BUȚU, Gina FIDLER, Steliana RODINO, Recovery and recycling of critical metals a strategic priority for European Union, SCIENCE AND TECHNOLOGIES IN GEOLOGY, EXPLORATION AND MINING, ISSUE 13, EXPLORATION AND MINING, 725 732, ISBN 978 619 7105 00 1, ISSN 1314 2704, DOI: 10.5593/sge m2017/13/S03.092, 2017.	https://www.sgem.org/sgemlib/spip.php?article9243
Alina BUTU, Steliana RODINO, Gina FIDLER, Marian BUTU, Resources management and eco efficiency Critical metals, an example, SCIENCE AND TECHNOLOGIES IN GEOLOGY, ENERGY AND CLEAN TECHNOLOGIES, ISSUE 4.2, RECYCLING AIR POLLUTION AND CLIMATE	https://www.sgem.org/index.php/call-for-papers/jresearch?view=publication&task=show&id=1221

CHANGE, 167 173, ISBN 978 619 74 08 45 4, ISSN 1314 2704, DOI: 10.5593/sgem2018/4.2, 2018	
Proceeding Gherghe, S. L. (2017) Considerations about recovery of critical metals using bio metallurgy. E3S WEB CONF.	*doi: 10.1051/e3sconf/20171801020*
Morais, PV. 2019 "ECOcircular: contribuição da microbiologia para uma estratégia de economia circular. Conferência Região de Coimbra, Empreendedorismo e Sustentabilidade, 29 Março 2019, Coimbra.	*https://www.cim-regiaodecoimbra.pt/regiao-de-coimbra-empreendedorismo-e-sustentabilidade*
Morais, PV. 2019 "Molecular design of biotools for metals recycling and bioremediation" BAGECO, 26 a 29 May 2019, Lisboa, Portugal, Plenary lecture.	*https://www.bageco.org*
Morais, PV. 2018 "Desafios na valorização de minérios e na economia circular na Região Centro" Debates Regionais sobre Recursos Minerais, no dia 10 de dezembro de 2018, Coimbra, Auditório da CCDR Centro.	*https://www.uc.pt/fctuc/dct/article?key=a-43d6f8a8fd*
Morais, PV. R. Branco, R. Francisco 2018 "New biotools for going from bioremediation to resources, a further step towards a circular economy" Ciência 2018 Encontro de Ciência e Tecnologia em Portugal, no dia 2 de julho de 2018 no Centro de Congressos de Lisboa.	*http://www.encontrociencia.pt/2018/home*
Morais, PV. 2018 "Microorganismos na biorremediação: o caso de estudo da Urgeiriça [Microorganisms in biorremediation: the case study of Urgeiriça]", May 9 2018, Salão Nobre da Câmara Municipal, Nelas. Workshop and Third reunion of the local action group of.	*Project REMIX Regiões Mineiras Europeias Verdes e Inteligentes, funded by INTERREG Europe PGI02400.*
Morais, PV. 2018. "Visão integrada dos objetivos dos projetos BioCritical Metals e PTW", May 4, Polo II, Department of Civil Engineering, FCTUC, University of Coimbra, Coimbra. Workshop "Environmentally sustainable processes in critical metals recovery: bi o (micro) technologies to support a circular economy of raw materials". Funded by projects PT W (PTDC/AAG REC/3839/2014) and BioCriticalMetals (ERAMIN/0002/2015).	*https://www.uc.pt/en/org/biocriticalmetals/activities/wokshop*
Morais PV. 2017. BioMicrotech to metals from microbial communities to miniaturized technology. Microb iotech 17 , Porto, Portugal, 5 8 dezembro 2017. Keynote speaker.	*http://www.porto.ucp.pt/pt/microbiotec17*
Morais P.V. 2017. A Biorremediação na recuperação de solos. SESSÃO 4: Desenvolvimentos recentes para recuperação de áreas contaminadas. Workshop "Economia Circular em Geotecnia Ambiental", Departamento de Engenharia Civil da Universidade de Coimbra, 22 de novembro 2017.	*https://www.uc.pt/fctuc/dct/documentos/2017_11_15_WECGA*
Morais P.V. 2017. Seminario sobre Diseño de microorganismos como productos para metodologias biosustentables, destinado a docentes y alumnos de la Carrera de Biotecnología; docentes y alumnos de 5to año de la carrera de ingeniería en minas y afines. Innova tive technologies for remediation of mining sites. Universidad Nacional de San Luis, Microcine, Rectorado 9th May 2017, 9.00 17.00	
Morais P.V. 2017. Objetivos del Proyecto Internacional BioCriticalMetals y su estado actual ERAMIN 2015 Sustainable Supply of Raw Materials in Europe. Innovative technologies for remediation of mining sites. Universidad Nacional de San Luis, Microcine, Rectorado 9th May 2017, 9.00 17.00. keynote speaker.	
Morais P.V. 2017. Desenhar microrganismos como produtos para metodologias biossustentáveis. III Encontro Nacional de Estudantes de Biotecnologia, 4 maio Universidade de Aveiro.	*https://pt-pt.facebook.com/IIIENEBT*
Morais P.V. 2016. BioCriticalMetals Recognition of microbial functional communities and assessment of the mineralizing potential (bioleaching) for high tech critical metals. Workshop Environmentally sustainable processes in critical metals recovery. University of Coimbra, Polo II, Portuga l, 6th June.	*https://www.uc.pt/en/org/biocriticalmetals/activities/wokshop*
Morais P.V. 2016. BioCriticalMetals. Seminar ERAMIN, Vinnova and Tekes, 26th Octobe r, Stockholm, Suécia.	

R. Francisco. 2018. Microorganismos na biorremediação: o caso de estudo da Urgeiriça [Microorganisms in biorremediation: the case-study of Urgeiriça], Salão Nobre da Câmara Municipal, Nelas. Third reunion of the local action group of Project REMIX – Regiões Mineiras Europeias Verdes e Inteligentes, funded by INTERREG Europe - PGI02400.	
Romeu Francisco, Rita Branco, Stefan Schwab, Ivo Baldani, and Paula V. Morais. 2019. A host-carried Cr(VI) Whole-Cell Biosensor for detection of environmental contamination transfer to the food chain". Session: III3. Bioeconomy and Sustainable Development, 5-7 December, Microbiotec19, University of Coimbra, Coimbra, Polo II.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Farias P, Francisco P, Sørensen S, Morais PV, "Proteomic to disentail the response to tellurite in highly metal resistant gram positive bacteria", 5th to 7th December 2019, at Microbiotec19, Coimbra, Portugal	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Proença DN*, Heine T, Senges CHR, Bandow JE, Morais PV, Tischler D. 2019. Bacterial metabolites produced under iron limitation attract Caenorhabditis elegans and kill pinewood nematode. Microbiotec19, Coimbra, Portugal.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Proença DN*, Heine T, Morais PV, Tischler D. 2018. Link between genomic identification and biochemical characterization of novel siderophores produced by endophytic bacteria. Soil biodiversity and European woody agroecosystems. (Annual Meeting of COST Action FP1305 BioLink Linking belowground biodiversity and ecosystem function in European forests). Granada, Spain.	https://granada-en.congresoseci.com/biolink_2018/abstractbook_biolink_granadauv/!
Branco R, Caldeira J, and Morais PV. Critical metals accumulation by strain Serratia fonticola A3_242: unveiling mechanisms of bacterium metal interactions . ". Microbiotec19. 5 7 December 2019. Coimbra, Portugal.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
R. Francisco. 2018. Siderophores: high affinity molecules for specific mobilization of metals", May 4, Polo II, Department of Civil Engineering, FCTUC, University of Coimbra, Coimbra. Workshop "Environmentally sustainable processes in critical metals recovery: bio (micro) technologies to support a circular economy of raw materials".	https://www.uc.pt/en/org/biocriticalmetals/activities/wokshop
Pinho, A.C., Fonseca, F., Francisco, R., Morais, P.V., Piedade A.P. 2019. 3D printing of nanocomposites: bacteria as raw material suppliers. Materiais 2019, XIX Congresso da Sociedade Portuguesa de Materiais e X International Symposium on Materials. 14-17 abril 2019, Reitoria da Universidade Nova de Lisboa, Lisboa.	http://spmateriais.pt/site/en/materiais-conference/materiais-2019
Chung, A.P., Coimbra, C., Farias, P., Francisco, R., Branco, R., Simão, F.V., Gomes, E., Pereira, A., Vila, M.C., Fiúza, A., Mortensen, M.S., Sørensen, S.J. and P.V. Morais. 2019. Microbial community structural and functional dynamics in basins of tungsten mine tailings: a vertical profile analysis. Session I4. Microbiomes Structure and Function, Microbiotec19, 5-7 December, University of Coimbra, Coimbra, Polo II.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Marian BUTU, Steliana RODINO, Alina BUTU, Critical Metals Recovery Using Biotechnological Methods, "Prospects for the Third Millennium Agriculture", 29 September - 1 October 2016, Cluj Napoca, Romania.	http://journals.usamvcluj.ro/index.php/zootehnie/article/view/12252/9973
Marian BUTU, Steliana RODINO, Alina BUTU, Screening of microorganisms for the recovery of critical metals, 12th edition of the National Symposium with International Participation „MEDICINAL PLANTS – PRESENT AND PERSPECTIVES", 06-09 September 2016, Piatra Neamț, Romania.	http://www.bio.uaic.ro/publicatii/anale_vegetala/issue/2016F1/01-2016F1.pdf
S. RODINO, A. BUTU, G. FIDLER, M. BUTU, Preliminary screening of bacterial isolates from mining wastes, IUBMB Symposium on Modern Biotechnologies in Sustainable Development of the Danube Delta – STANDArD, May 31 - June 2, 2016, Murighiol, Tulcea, Romania.	http://www.studiauniversitatis.ro/?p=643

A. BUTU, S. RODINO, A DOBRE, M. BUTU, Potential of microbial functional communities for high-tech critical metals recovery, IUBMB Symposium on Modern Biotechnologies in Sustainable Development of the Danube Delta – STANDArD, May 31 - June 2, 2016, Murighiol, Tulcea, Romania.	http://www.studiauniversitatis.ro/?p=645
Alina BUȚU, Steliana RODINO, Gina FIDLER, Marian BUȚU, Romanian contribution on the international project ERA-MIN BioCriticalMetals, Prima ediție a ”BURSEI NAȚIONALE A INVENȚIILOR ROMÂNEȘTI”, 20 iunie 2017, Palatul Parlamentului, București, România.	
Alina BUȚU, Steliana RODINO, Marian BUȚU, Gina FIDLER, Functional microbial consortia for the extraction of high-tech critical metals, Salonul Cercetării Românești 2017, 25-27 Octombrie 2017, Palatul Parlamentului, București, România.	
Steliana RODINO, Alina BUȚU, Ovidiu IORDACHE, Marian BUȚU, Functional microorganisms with application in high-tech critical metals bioaccumulation, The International Conference of the University of Agronomic Sciences and Veterinary Medicine of Bucharest "Agriculture for Life, Life for Agriculture", June 8 - 10, 2017, Bucharest, Romania.	
Alina BUȚU, Steliana RODINO, Monica BUTNARIU, Marian BUȚU, Critical metals - the challenges of the present, solutions for the future, BioTech 2017 & the 7th Czech-Swiss Symposium with Exhibition, June 13 - 17, 2017, Prague, Czech Republic.	http://www.biotech2017.cz/domains/biotech2017.cz/data/uploads//BioTech2017_abstractbook_web2.pdf
Alina BUȚU, Marian BUȚU, Gina FIDLER, Steliana RODINO, Recovery and recycling of critical metals - a strategic priority for European Union, 17th INTERNATIONAL MULTIDISCIPLINARY SCIENTIFIC GEOCONFERENCE & EXPO SGEM 2017, 27 June – 6 July 2017, Albena, Bulgaria.	
Alina BUȚU, Steliana RODINO, Marian BUȚU, Current status of NIRDBS ongoing research and WP4 progress, BioCriticalMetals Meeting and International workshop “Innovative technologies for remediation of mining sites”, 6-12 May, San Luis, Argentina.	
A. BUȚU, S. RODINO, M. BUȚU, Recovery of High-Tech Critical Metals - Current Progress and Future Perspectives (keynotes), 5th International Conference on Chemical and Biological Sciences - ICCBS 2018, March 7 - 9, 2018, Bucharest, Romania.	
Alina BUTU, Steliana RODINO, Gina FIDLER, Marian BUTU, Resources management and eco-efficiency - Critical metals, an example, 18th International Multidisciplinary Scientific GeoConference SGEM, 30 June - 9 July 2018, Albena, Bulgaria.	
Alina BUȚU, Steliana RODINO, Marian BUȚU, Recovery of High-Tech Critical Metals - Context, Progress and Perspectives (keynotes), 21st INTERNATIONAL SYMPOSIUM – SIMI 2018 “THE ENVIRONMENT AND THE INDUSTRY”, September 20 - 21, 2018, Bucharest, Romania.	
Steliana RODINO, Alina BUTU, Gina FIDLER, Marian BUTU, Ability of bacterial strains for bioaccumulation of critical metals, The 17th International Symposium PROSPECTS FOR 3rd MILLENNIUM AGRICULTURE, 27–29 September 2018, Cluj-Napoca, Romania.	http://symposium2018.usamvcluj.ro/wp-content/uploads/2018/09/PROGRAM-BOOKLET-25.09.2018-format-A4.pdf
Florentin Stoiciu, Mihai Ghiţă, Alina Buţu, Steliana Rodino, Gina Fidler, Dumitru Valentin Drăguţ, Laura Eugenia Bărbulescu, Ionuţ Măcărescu, Biosolubilisation tests for critical metals using isolated micro-organisms from mining waste disposal sites, SIMPOZIONUL ŞTIINŢIFIC NAŢIONAL cu participare internaţională “MIRCEA SAVUL”, 27 Octombrie 2018, Iasi, Romania.	http://geology.uaic.ro/wp-content/uploads/2018/10/Simpozion_M_Savul_2018_geologie_UAIC.pdf
Alina BUȚU, Steliana RODINO, Marian BUȚU, FUNCTIONAL MICROORGANISMS AND CONSORTIA FOR RECOVERY OF HIGH-TECH CRITICAL METALS, 1st INTERNATIONAL CONFERENCE ON EMERGING	

TECHNOLOGIES IN MATERIALS ENGINEERING EmergeMAT, November 14 - 16, 2018, Bucharest, Romania.	
M. GHIȚĂ, A. BUȚU, A.-G. VĂTUI, S.-N. VÂLSAN, D.-C. MIHĂIESCU, S. RODINO, A.-N. GHIȚĂ, Copper Mining Tailings from Sasca Montana: Mineralogical Context; Bioprocessing; Critical Metals Assessment, BRAMAT 2019 11TH INTERNATIONAL CONFERENCE ON MATERIALS SCIENCE & ENGINEERING, 13 - 16 MARCH 2019, POIANA BRASOV.	http://www.bramat.ro/uploads/7/7/4/0/77408170/program_bramat2019m.pdf
Alina BUTU, Steliana RODINO, Marian BUTU, Microbial Strains for High-Tech Critical Metals Recovery, The 5th International Conference on Bioengineering and Biotechnology (ICBB'19), August 18 - 20, Lisbon, Portugal 2019.	
Algunos aportes tecnologicos y sociales del proyecto BioCriticalMetals para una mineria sustentable" in San Rafael/Mendoza, from 26 to 27 October 2017 by Veronica Saavedra.	
António Fiúza (2018). Analytical and critical overview of industrial applications of bio-hydromineralugical processes. Workshop Environmentally sustainable processes in critical metals recovery: bio (micro) technologies to support a circular economy of raw materials, Coimbra, 2018.	https://drive.google.com/open?id=1QBpaCGHPol5hgkIiHJKrcBYxxs_C8byF
Diana Madureira (2018). Bioleaching assays in flask and batch-bioreactor in the scope of BIOCriticalMetals project. Workshop Environmentally sustainable processes in critical metals recovery: bio (micro) technologies to support a circular economy of raw materials, Coimbra, 2018.	https://drive.google.com/open?id=1xRAgGB9TVVqe-ZaE-nYP5pOTwn3XMMGv
Antonio Fiuza, Problemas ambientales de diferentes tipos de residuos mineros y algunas soluciones posibles. Workshop Tecnologías Innovadoras para la r emediación de sitios mineros. Universidad Nacional de San Luis, Rectorado, Maio, 2017.	https://drive.google.com/open?id=1NBy6qcSluZpK2Xt-NUl5bfHDq1aqiBB
Cristina Vila, Bioleaching of a pegmatite lithium ore, Workshop Environmentally sustainable processes in critical metals recovery: bio (micro) technol ogies to support a circular economy of raw materials, Coimbra.	https://drive.google.com/open?id=1slNIg8QkDe4XVjJ3i7CW_oginDZfKeny
Conferencia "Algunos aportes tecnologicos y sociales del proyecto BioCriticalMetals para una mineria sustentable" by Veronica Saavedra, en "Workshop: Perspectivas tecnicas para una mineria sustentable", San Rafael, Mendoza, 26 y 27 de octubre 20 17.	http://fcai.uncuyo.edu.ar/workshopperspectivas-tecnicas-para-una-mineriasustentable-perspectivas-tecnicas-para-una-mineria-sustentable
Farias P, Paixão J, Morais PV; “Bacterial consortium effectiveness on tellurium bioleaching”, 18th 220th October 2017, at BioMicroWorld2017, Madrid, Spain.	http://www.wikicfp.com/cfp/servlet/event.showcfp?eventid=62232&copyownerid=33604
Farias P, Paixão J, Morais PV; “Bacterial consortium as a tool for increasing efficiency in tellurium bioleaching”, 7th to 9th, at Microbiotec17, Porto, Portugal.	http://www.porto.ucp.pt/pt/microbiotec17
Silva SP, Coimbra C, Farias P, Francisco R, Morais PV; "Innovative methodology to track bioleaching potential”, 7th to 9th, at Microbiotec17, Porto, Portugal.	http://www.porto.ucp.pt/pt/microbiotec17
Farias P, Francisco R, Morais PV, “Metabolic response to tellurite by environmental Bacillus”, 8th July 2019, at Ciência 2019 Science and Technology in Portugal Summit, Lisbon Congress Centre, Lisbon, Portugal.	http://www.encontrociencia.pt/2019/home
Francisco, R., Branco, R., Schwab, S., Baldani, J.I. and P.V. Morais. 2017. Impact of bacteria Cr(VI)-biosensor on plant growth and functionality of plant-bacteria systems under contamination. Microbiotec’17, 7-9 December, Universidade Católica Portuguesa, Porto, Portugal.	http://www.porto.ucp.pt/pt/microbiotec17
Farias, Pedro; Morais, Paula V. 2020. "Yce operon arrangements to improve tellurite resistance and reduction in Bacillus strains". January 2020, at IMPSG2020 , Faro.	https://impsg2020.wixsite.com/impsg2020

Proença DN, Heine T, Mehnert M, Morais PV, Tischler D. 2017. Biochemical Characterization and Genomic Deciphering of Siderophores produced by Endophytic Bacteria Isolated from Pinus pinaster Affected by Pine Wilt Disease. Microbiotec'17. Porto, Portugal.	http://www.porto.ucp.pt/pt/microbiotec17
Proença DN, Heine T, Mehnert M, Morais PV, Tischler D. 2017. Genomic Identification and Biochemical Characterization of Siderophores Produced by Endophytic Bacteria Isolated from Pinus pinaster affected by Pine Wilt Disease. ASM Microbe 2017. New Orleans, LA, USA.	https://www.showsbee.com/fairs/25161-ASM-Microbe-2017.html
Caldeira JB, Morais PV, Branco R, "Unravelling mechanisms involved in critical metal resistance by the strain Rhodanobacter thiooxydans B2A1Ga4 ", 5th to 7th December 2019, at Microbiotec19, Coimbra, Portugal.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Coimbra, C., Branco, R., and Morais, P. V. "Organization of tupBCA gene cluster of Sulfitobacter species: adapting to the environment". IMPSG-2020. 23-24 January 2020. Faro, Portugal.	https://impsg2020.wixsite.com/impsg2020
Coimbra, C., Branco, R., and Morais, P. V. "Expression of TupBCA from Sulfitobcter dubius for a better W accumulation in Escherichia coli cells". Microbiotec19 5 7 December 2019 Coimbra, Portugal.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Coimbra, C., Saavedra, V., Romano, E., Longar, B., and Morais, P. V. "Diversity of isolates tolerant to multi metals from mina Los Cóndores, Argentina". Microbiotec19 5 7 December 2019 Coimbra, Portugal.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Coimbra, C., Francisco, R., and Morais, P.V. "Diversity of Tungsten resist a nt non acidophilic bacterial strains from Tungsten mine tailings". BioMicroWorld2017 17 19 October 2017 Madrid, Spain	http://www.wikicfp.com/cfp/servlet/event.showcfp?eventid=62232&copyownerid=33604
Coimbra, C., Branco, R., Chung, A.P., Francisco, R., and Morais, P.V. "Bioleaching potential of nonacidophilic bacteria from Panasqueira mine in Fundão Portugal". Microbiotec17 7 9 December 2017 Porto, Portugal.	http://www.porto.ucp.pt/pt/microbiotec17
Almeida M C, Branco R and Morais P V. Response to vanadate toxicity in Ochrobactrum tritici strains. Microbiotec19. 5 7 December 2019. Coimbra, Portugal.	http://microbiotec19.net/test/wp-content/uploads/2019/07/Book_abstract_online.pdf
Madureira, D., Brás, F., Lopes, A., Nunes , O., Vila, M., Santos, S., Fiúza, A. "Use of a microbial community from a mine site for the sustainable recovery of metals". Poster presented at MICROBIOTEC17, 7 9 December 2017; Porto, Portugal	http://www.porto.ucp.pt/pt/microbiotec17
2018 Diana Madureira; Ana Pinto; M. Cristina Vila; Olga Nunes; Sílvia Santos; Francisca Brás; Aurora Futuro; M. Lurdes Dinis; António Fiúza (2018) "Selection of a microbial consortium towards the sustainable recovery of critical metals". IJUP 2018.	https://ijup.up.pt/2018/wpcontent/uploads/sites/137/2018/02/LivroResumos2018.pdf
Ana M. Diaz, Parastou Sadeghi, Giuditta Romio, Olga C. Nunes, M. Cristina Vila, Appraisal of two microbial cultures in metal bio recovery from Panasqu eira mine byproduct, DOCTORAL CONGRESS IN ENGINEERING.	https://paginas.fe.up.pt/~dce/2019/wpcontent/uplo ads/2020/01/1.pdf
Cristina Vila, Biohydrometallurgy From laboratory to industrial scale, Encontros com a Ciência FCT, Lisboa, Julho.	https://drive.google.com/open?id=1Oxw7uSkAkIRBR9y_wfHcoOSWnTc4VTBf
Butu A., Rodino S., Butu M., Biomining recovery of high tech critical metals, 16th International Conference on Environmental Science and Technology, Rhodes, Greece, 4 to 7 September 2019.	https://cest2019.gnest.org/sites/default/files/presentation_file_list/cest2019_00929_poster_paper.pdf
"Implications of (geo)microbiology in waste management" pelo Professor Harald Weigand, Dean of Studies KMUB, Technische Hochschule Mittelhessen THM University of Applied Sciences, Gernamy. Conferência no âmbito dos projetos "PTW Biotools for a sustainable supply of tungsten from biodetection to bioleaching and biorecovery" e "BIOCriticalMetals: Recognition of microbial functional communities and assessment of the mineralizing potential (bioleaching) for high tech critical metals", e como parte do European	

Innovation Partnership Commitment BioAlMinore. 20 setembro 2016, polo II, Universidade Coimbra.	
workshop "Environmentally sustainable processes in critical metals recovery" ligado ao projeto "BIOCriticalMetals : Recognition of microbial functional communities and assessment of the mineralizing potential (bioleaching) for high tech critical metals" financiado pelo 3rd ERA MIN Joint Call (2015) sustainable supply of raw materials in Europe e como parte do Europe an Innovation Partnership Commitment BioAlMinore, em colaboração com o grupo que coordena Julho 2016, polo II, Universidade Coimbra.	https://agenda.uc.pt/eventos/environmentally-sustainable-processes-in-critical-metals-recovery-bio-micro-technologies-to-support-a-circular-economy-of-raw-materials
Brainstorming on application of microtechnologies to applied cases, on May 3rd, 2018 Polo II, Department of Civil Engineering, FCTUC, University of Coimbra, Coimbra. Event integrated in the Workshop "Environmentally sustainable processes in critical metals recovery: bio (micro) technologies to support a circular economy of raw materials" and funded by projects PTW (PTDC/AAG REC/3839/2014) and BioCriticalMetals (ERAMIN/0002/2015).	https://www.uc.pt/fctuc/dcv/imagens_destaques/environmentally
Workshop DGGE: o mesmo princípio novo aplicações? Janeiro 2018. Universidade de Coimbra, Faculdade de Farmácia, Coimbra, Portugal. Detalhar a técnica de eletroforese por gradiente de desnaturação.	

❖ Project CHARPHITE:

Title	Link (doi or similar)
Cruceru M Valentim B., Predeanu G., Abagiu T., Slăvescu V., Anghelescu L., 2016, Increasing the residual carbon content from bottom ash by particle size separation, WSEAS TRANSACTIONS on ENVIRONMENT and DEVELOPMENT, Volume 12, 2016,337-342.	http://www.wseas.org/multimedia/journals/environment/2016/a705815-056.pdf
Anghelescu, L., Abagiu, T., Cruceru, M., Valentim, B., Predeanu, G., Diaconu, B., Slăvescu, V., 2017.Utilization of Coal-Fired Ash Waste in the Production of Heat-Resistant Refractory Products. 13thInternational Conference on Energy, Environment, Ecosystems and Sustainable Development (EEESD '17), Dubrovnik, Croatia 27-29 September 2017.	https://www.researchgate.net/publication/328392182_Utilization_of_coal-fired_ash_waste_in_the_production_of_heat-resistant_refractory_products
Cruceru, M., 2017. From Polluting Waste to Raw Material – plenary lecture. International Conference on Environmental Science and Geoscience, Athens, Greece, 9-11 April 2017.	http://www.inase.org/conferences/2017/athens/esg.html
Cruceru, M., Abagiu, T.A., Anghelescu, L., Diaconu, B., 2017. Obtaining building materials from coal ash after separation of the residual carbon. International Conference on Environmental Science and Geoscience, Athens, Greece, 9-11 April 2017.	http://www.naun.org/main/UPress/saed/2017/a162014-037.pdf
Cruceru, M., Diaconu, B., Anghelescu, L., Abagiu, T.A.,2017. Study on char recovery from bottom coal ash. International Conference on Energy, Environment, Development and Economics Heraklion, Grecia, 14-17July 2017.	http://www.naun.org/main/NAUN/energyenvironment/2017/a182011-040.pdf
Anghelescu, L., Abagiu, T., Cruceru, M., Valentim, B., Diaconu, B., Predeanu, G., 2017. Obtaining thermal insulating refractory products using ash from thermal coal containing residual coal. International Journal of Power Systems, vol. 2, pp. 14-20.	https://pdfs.semanticscholar.org/705d/74887186688387bb88e6b3c5d2a2257f85148.pdf?_ga=2.38826666.869223627.1583251974-2014172282.1569929620
Anghelescu, L., Abagiu, T., Cruceru,M., Valentim, B.,Predeanu, G., Diaconu, B., Slăvescu, V., 2017.Utilization of Coal-Fired Ash Waste in the Production of Heat-Resistant Refractory	https://www.iaras.org/iaras/filedownloads/ijes/2017/008-0040(2017).pdf

Products, International Journal of Environmental Science, vol. 2, pp. 272-277.	
Cruceru, M., Abagiu, T.A., Anghelescu, L., Diaconu, B.,2017. Study on char recovery from bottom coal ash, International Journal of Energy and Environment, vol.11, pp. 64-68.	http://www.naun.org/main/NAUN/energyenvironment/2017/a182011-040.pdf
Cruceru, M., Abagiu, T.A., Anghelescu, L., Diaconu, B.,2017. Obtaining building materials from coal ash after separation of the residual carbon, International Journal of Systems Applications, Engineering &Development, vol. 11, pp. 45-49.	http://www.naun.org/main/UPress/saed/2017/a162014-037.pdf
Cruceru, M., Valentim, B., Barbara, B., Freire, C.,Lazaro Martinez, J., Predeanu, G., Wagner, N., Santos, C., Abagiu, T., Anghelescu, L., 2017. Pre concentration techniques for residual coal from bottom ash. Part 1–Methodology and procedures. Annals of the "Constantin Brancusi" University of Targu Jiu, Engineering Series 2, 9-14.	http://www.utgjiu.ro/revista/ing/pdf/2017-2/01_M.CRUCERU%20s.a%20-PRE-CONCENTRATION%20TECHNIQUES%20FOR%20RESIDUAL%20COAL%20FROM%20BOTTOM%20ASH.%20PART%201%20-%20METHODOLOGY%20AND%20PROCEDURES.pdf
Cruceru, M., Valentim, B., Anghelescu, L., Barbara, B.,Freire, C., Lazaro Martinez, J., Predeanu, G., Wagner,N., Santos, C., Abagiu, T., 2017.Pre concentration techniques for residual coal from bottom ash. Part 2–Results and discussion. Annals of the "Constantin Brancusi" University of Targu Jiu, Engineering Series 2,15-20.	http://www.utgjiu.ro/revista/ing/pdf/2017-2/02_M.CRUCERU%20s.a%20-PRE-CONCENTRATION%20TECHNIQUES%20FOR%20RESIDUAL%20COAL%20FROM%20BOTTOM%20ASH.%20PART%202%20%E2%80%93%20RESULTS%20AND%20DISCUSSION.pdf
Cruceru, M., Valentim, B., Diaconu, B., Anghelescu, L.,2018. Procedures for Recovering the Residual Coal from Bottom Ash. International Journal of Energy and Environment, vol. 12, 18-23, 2018. ISSN: 2308-1007.	http://www.naun.org/main/NAUN/energyenvironment/2018/a062011-018.pdf
Cruceru, M., Valentim, B., Predeanu, G., Abagiu, T.A., Slavescu, V., Anghelescu, L., 2017.Concentration of the residual carbon from bottom ash by particle size separation, International Journal of Geology, vol. 11, pp. 1-7.	http://www.naun.org/main/NAUN/geology/2017/a022004-079.pdf
Diaconu, B. and Cruceru, M.,2017. Enhancing conduction heat transfer in phase change materials–graphite inserts, International Journal of Materials, vol. 4, pp. 22-25.	http://www.naun.org/main/NAUN/materials/2017/a102018-069.pdf
Joanna Całus-Moszko, Barbara Białecka, Krzysztof Wierzchowski, 2017. The possibility of separing and utilising char obtained from fly ashes. In: Proceedings of the 17th International Multidisciplinary Scientific Geo Conference SGEM 2017, 29 June-5 July, 2017, Vol. 17 / 11, 1125-1132. DOI:10.5593/sgem2017/11/S04.144	https://www.sgem.org/index.php/elibrary-research-areas?view=publication&task=show&id=2463
Santos, C., Abagiu, T.A., Białecka, B., Cruceru, M.,Freire, C., Guedes, A., Martinez, J., Popescu, L.,Predeanu, G., Wagner, N., Valentim, B., 2017.Assessment of the critical elements Be, Bi, Co, Ga, Hf, In, Nb, Sb, Ta, V, W in coals and respective ashes. In: Livro de Actas do VII Congresso Jovens Investigadores em Geociências, LEG 2017, Estremoz, 25-26Novembro 2017.	
Santos, C., Abagiu, T.A., Białecka, B., Cruceru, M.,Freire, C., Guedes, A., Martinez, J., Popescu, L.,Predeanu, G., Wagner, N., Valentim, B., 2017.Assessment of the critical elements Be, Bi, Co, Ga, Hf,In, Nb, Sb, Ta, V, W in coals and respective ashes. In: Livro de Actas do VII Congresso Jovens Investigadores em Geociências, LEG 2017, Estremoz, 25-26Novembro 2017.	https://www.fc.up.pt/charphite/?page_id=143
Santos, C., Białecka, B., Freire, C., Guedes, A.,Martinez, J., Popescu, L., Predeanu, G., Wagner, N.,Valentim, B., 2017.Distribution of lanthanides, yttriumand scandium in ashes from coal-fired power stations. Abstract. Goldschmidt2017 Conference. Poster comm. session 18d (gold2017: abs:2017004330).	https://goldschmidtabstracts.info/abstracts/abstractView?id=2017004330

Guedes, A., Abagiu, T.A., Białecka, B., Cruceru, M.,Freire, C., Martinez, J., Predeanu, G., Santos, C., Wagner, N., Valentim, B., 2017.Carbon forms in coal, fly ash and bottom ash. Abstract. Goldscmhidt 2017 Conference. Poster comm. Session (gold 2017: abs:2017004487).	https://goldschmidtabstracts.info/2017/1455.pdf
Santos, A., Abagiu, T., Anghelescu, L., Badenhorst, C.,Bialecka, B., Calus-Moszko, J., Cempa, M., Cruceru, M.,Flores, D., Freire, C., Guedes, A., Klupa, A., Martinez,J.L., Popescu, L., Predeanu, G., Ribeiro, J., Slavescu, V.,Wagner, N., Wrana, A., Valentim, B., 2017. Project CHARPHITE: presentation and up to date of Porto University results. Jornadas do ICT, 26-27 Junho, Universidade do Minho. Book of abstracts, pag.38. ICT–INSTITUTO DE CIÊNCIAS DA TERRA.	http://www.ict.org.pt/.https://www.fc.up.pt/charphite/?page_id=143
Char extracted from coal ash as a replacement for natural graphite–Charphite.	https://www.fc.up.pt/charphite/?page_id=143
Anghelescu, L., Cruceru, M., Diaconu, B.M., Valentim,B., 2018.Usage of bottom ash from coal combustion to replace natural aggregate in manufacturing of building materials. In Conference Proceedings of the"18th International Multidisciplinary Scientific Geoconference-SGEM 2018", Vol. 18, Issue 4.2Energy and Clean Technologies, 231-238, IUN.2018.ISBN 978-619-7408-45-4, ISSN 1314-2704.	DOI: 10.5593/sgem2018/4.2.https://www.sgem.org/sgemlib/spip.php?article12489
Cruceru, M., Diaconu, B.M., Valentim, B., Anghelescu,L., 2018.Possible uses of coal in circular economy. In Conference Proceedings of the "18th International Multidisciplinary Scientific Geoconference-SGEM2018", Vol. 18, Issue 4.2 Energy and Clean Technologies, 113-120, IUN.2018. ISBN 978-619-7408-45-4, ISSN 1314-2704, DOI:10.5593/sgem2018/4.2.	https://www.sgem.org/index.php/elibrary?view=publication&task=show&id=1214
Cruceru, M., Valentim, B., Diaconu, B., Anghelescu, L., 2018.Procedures for Recovering the Residual Coal from Bottom Ash. In abstracts book of "The 2018International Conference on Energy, Environment, Ecosystems, and Development", Venice, Italy, April 28-30, 2018.	http://www.naun.org/main/NAUN/energyenvironment/2018/a062011-018.pdf
Anghelescu, L., Cruceru, M., Valentim, B., Diaconu, B.,2018. Coal ash inorganic residue as raw material for construction elements. International Journal of Chemistry and Chemical Engineering Systems, Volume3, 50-55. ISSN: 2367-9042.	https://www.iaras.org/iaras/filedownloads/ijcces/2018/016-0009(2018).pdf
Diaconu, B., Cruceru, M., Anghelescu, L., 2018.Graphite inserts for management of thermal conductivity in phase change materials–Performances and limitations. International Journal of Materials, vol. 5, 19-24, 2018. ISSN: 2313-0555.	http://www.naun.org/main/NAUN/materials/2018/a102018-054.pdf
Nunes, M., Santos, A.C., Valentim, B., Freire, C., 2018.Coal char as cathode material for the electrochemical production of hydrogen peroxide. SPE 2018–XXIII Meeting of the Portuguese Electrochemical Society, Porto, Portugal, 2nd-4th May 2018.	https://www.fc.up.pt/spe2018/docs/Livro%20de%20Abstracts%20Final.pdf
Silva, S.M., Costa, M.,Peixoto, A.F., Nunes, M., Santos,A.C., Valentim, B., Freire, C., 2018.HSO3- functionalized carbon-derived industrial residues: solid acid catalysts for butyl-levulinate production. CarbocatVIII–8th International Symposium on carbon for catalysis, Porto, Portugal, 26th-29th June 2018.	https://www.fc.up.pt/charphite/?page_id=143
Nunes, M., Santos, A.C., Valentim, B., Freire, C., 2018.Coal char as electrocatalyst for the oxygen reduction and evolution reactions, Carbon 2018, Madrid, Spain,1st-6th July.	https://www.fc.up.pt/charphite/?page_id=143

Peixoto, A.F., Silva, S.M., Nunes, M., Santos, A.C., Valentim, B., Lázaro-Martínez, J.M., Freire, C., 2018.Sulfonic acid-functionalized coal fly ashes: new solid acid catalysts for esterification reactions, Carbon2018, Madrid, Spain, 1st-6th July 2018.	https://www.fc.up.pt/charphite/?page_id=143
Santos, A.C., A. Guedes, B. Valentim, 2018.Pre-concentration trials to obtain char from fly ashes: preliminary results. Abstract in: Livro de resumos das Jornadas do ICT 2018, 28-29 May 2018, Faculdade deCiências da Universidade do Porto, p. 43.	https://www.fc.up.pt/charphite/?page_id=143
Valentim, B., Bialecka, B., Calus-Moszko, J., Cruceru,M., Freire, C., Guedes, A., Lázaro-Martinez, J.,Popescu, L., Predeanu, G., Wagner, N., 2018.CHARPHITE Project: coal char as a substituting material of natural graphite in green energy technologies. Abstract number: 220. The World Conference on Carbon, Carbon 2018. Madrid, Spain,July 1st-6th.	https://www.fc.up.pt/charphite/?page_id=143
Santos, A.C., Peixoto, A.F., Valentim, B., LázaroMartínez, J.M., 2018. RMN en estado sólido aplicado al estudio de cenizas de carbón. In book o abstracts of the "IV Taller de Resonancia Magnética", 6 y de septiembre de 2018. Fundación Instituto Leloir, Buenos Aires, Argentina, p. 45.	https://www.fc.up.pt/charphite/?page_id=143
Valentim, B., Białecka, B., Gonçalves, P.A., Guedes, A.,Guimarães, R., Cruceru, M., Całus-Moszko, J., Popescu,L.G., Predeanu, G., Santos, A.C., 2018.Undifferentiated inorganics" in coal fly ash and bottom ash: calci spheres, magnesia calcispheres, and magnesia spheres. Minerals 2018, 8, 140; doi:10.3390/min8040140.	*doi: 10.3390/min8040140.*
Badenhorst, C., Wagner, N., Valentim, B., Viljoen, F.,2018. The extraction of char from a variety of coal ash for consideration as synthetic graphite. ICCP Symposium on "Organic Petrology in the 21stCentury" and 70th Meeting of the International Committee for Coal and Organic Petrology (ICCP), September 23-29, 2018, Brisbane, Australia.	https://www.fc.up.pt/charphite/?page_id=143
Badenhorst, C., Wagner, N.J., Viljoen, F., Valentim, B.,2018. Char extracted from coal ash as a replacementfor natural graphite–Charphite. Geocongress 2018,17–20 July, 2018, University of Johannesburg, SouthAfrica (abstract # 62/ poster).	https://www.fc.up.pt/charphite/?page_id=143
Badenhorst, C., 2018. Fifty shades of ash. Presentation Competition: Visualize Your Thesis. Postgraduate symposium, University of Johannesburg, p. 13.	https://www.fc.up.pt/charphite/?page_id=143
Valentim, B., Anghelescu, L., Białecka, B., Diaconu, B.,Guedes, A., Moreira, K., Całus-Moszko, J., Martinez,J.L., Popescu, L.G., Predeanu, G., Santos, A.C., Wagner,N., Penka, Z., Cruceru, M., 2019. Comparison between the properties of building materials manufactured from bottom ash and fly ash Part 1: materials and procedures. "CONFERENG 2019", Section 3 Power and Electric Engineering. November 22th-23th, 2019, Târgu-Jiu (Romania). Romanian Academy of Technical Sciences, "CONSTANTIN BRÂNCUŞI", University of Târgu-Jiu, Faculty of Engineering.	http://ing.utgjiu.ro/wp-content/conferinte/confereng2019/index.html
Valentim, B., Anghelescu, L., Białecka, B., Diaconu, B.,Guedes, A., Moreira, K., Całus-Moszko, J., Martinez,J.L., Popescu, L.G., Predeanu, G., Santos, A.C., Wagner,N., Velev, G.T., Cruceru, M., 2019. Comparison between the properties of building materials manufactured from bottom ash and fly ash Part 2:	http://ing.utgjiu.ro/wp-content/conferinte/confereng2019/index.html

results and discussions. "CONFERENG 2019", Section 3Power and Electric Engineering. November 22th-23th, 2019, Târgu-Jiu (Romania). Romanian Academy of Technical Sciences, "CONSTANTIN BRÂNCUŞI", University of Târgu-Jiu, Faculty of Engineering.	
Anghelescu, L., Cruceru, M., Diaconu, B., 2019.Building materials obtained by recycling coal ash and waste drilling fluid and characterization of engineering properties by means of Artificial Neural Networks. Construction and Building Materials 227, 116616.	*https://doi.org/10.1016/j.conbuildmat.2019.07.342https://doi.org/10.1016/j.conbuildmat.2019.07.342*
Cruceru, M., Diaconu, B.M., Serban, G., 2019.Influence of SNCR process on the dynamics of the combustion and on the content of unburned carbon in the bottom ash. In: Book of Conference proceedingsVol.19, Issue 4.1, of the 19th International Multidisciplinary Scientific Geo Conference SGEM2019, 30 June-6 July, 2019. Pag. 727-732. ISBN: 978-619-7408-83-6; ISSN: 1314-2704.	*DOI: 10.5593/sgem2019/4.1/S18.092DOI:10.5593/sgem2019/4.1/S18.092*
Cruceru, M., Diaconu, B. M., Valentim, B., Anghelescu,L., 2019.A process flow for extraction of unburned carbon from bottom ash-economical and environmental assessment. In: Book of ConferenceproceedingsVol.19, Issue 4.1, of the 19thInternational Multidisciplinary Scientific Geo Conference SGEM 2019, 30 June-6 July, 2019.645-652. ISBN: 978-619-7408-83-6; ISSN: 1314-2704.	*https://www.sgem.org/index.php/elibrary?view=publication&task=show&id=5887*
Predeanu, G., Valentim, B.R.V., Guedes, A., Santos,A.C., Moreira, K.S., Cruceru,M., Popescu, L.G., Wagner, N.J., Badenhorst, C.J., Slăvescu, V., 2019Petrographic identification of char morphotypes in combustion waste products of different origin. In: Book of abstracts of the 71st Annual Meeting of the International Committee for Coal and Organic Petrology, PP17, page 37.	*https://www.fc.up.pt/charphite/?page_id=143*
Krzysztof Wierzchowski, Barbara Białecka, Agnieszka Klupa, 2019. Losses of combustible substance on the background of characteristics of fly ashes of the selected polish coal-fired power plants International. International Journal of Coal Preparation and Utilization 39.	*https://doi.org/10.1080/19392699.2019.1665032*
Santos, A.C., Moreira, K., Guedes, A., Valentim, B.,2019. Characterization of coal char by Raman micro spectroscopy before and after acid leaching. In: book of abstracts (gold2019: abs:2019003475) of the "Goldschmidt2019", 18-23 August, Barcelona, Spain.	*https://goldschmidtabstracts.info/2019/2957.pdf*
Moreira, K., Santos, A.C., Valentim, B., Guedes, A.,2019. Raman microspectroscopy characterization of graphite from "Terra Negra and Ferreiros" mine (NW Portugal). In: book of abstracts (gold 2019: abs:2019003486) of the "Goldschmidt2019", 18-23 August, Barcelona, Spain.	*https://goldschmidtabstracts.info/2019/2335.pdf*
Santos, A.C., Guedes, A., Moreira, K., Valentim, B.,2019. Concentration and distribution of toxicelements in coal and respective combustion ashes. In: Book of abstracts of the Jornadas do ICT, 24-25 May, University of Évora, Portugal. Pag. 24.	*https://www.fc.up.pt/charphite/?page_id=143*
Valentim, B, Freire, C., Guedes, A., Lázaro-Martínez, J.,Nunes, M., Peixoto, A., Santos, A.C., 2019.Study on the potential of coal fly ash as solid acid catalysts and respective char as carbon-based electrocatalysts. In: Book of abstracts of the	https://www.fc.up.pt/charphite/?page_id=143

World Congress on Recycling, May 13-14, 2019, Valencia, Spain. BEST POSTERAWARD.	
Santos, A. C., Guedes, A., Bialecka, B., Badenhorst, C.J., Predeanu, G., Calus-Moszko, J., Lázaro-Martínez, J.M., Popescu, L., Cruceru, M., Wagner, N. J.,Guimarães, R., Valentim, B. R. V., 2019.Recovery of carbonaceous solid residue (char) from coal ash to use as possible substitute graphite-based materials in green energy applications. World of Coal Ash (WOCA)Conference, St. Louis (Missouri), 17-20 May. In: http://www.flyash.info/2019/226-abstract.pdf. Poster presentation. The "WOCA 2019 Student Poster Presentation Award" sponsored by the American Coal Ash Association (ACAA) Ed Foundation.	http://www.flyash.info/2019/226-abstract.pdf
Santos, A.C., Guedes, A., Moreira, K., Valentim, B.,2019. Assessment of the potential for extraction of REE from fly ashes and bottom ashes derived from commercial coals burned in a Portuguese power plant. In: Book of abstracts of the 71st Annual Meeting of the International Committee for Coal and Organic Petrology, PP20, page 41.	https://www.fc.up.pt/charphite/?page_id=143
Badenhorst, C. J., Wagner, N. J., Valentim, B. R. V.,Santos, A. C., Guedes, A., Bialecka, B., Calus-Moszko,J., Popescu, L., Cruceru, M., Predeanu, G., Viljoen, K., S., Lázaro-Martínez, J. M., Abagiu, T. A., 2019. Char from coal ash as a possible precursor for synthetic graphite–Recent developments of the Charphite project. World of Coal Ash (WOCA) Conference, St. Louis (Missouri), 17-20 May. In: http://www.flyash.info/2019/077-paper.pdf. Oral presentation.	http://www.flyash.info/2019/077-paper.pdf
Badenhorst, C.J., Wagner, N.J., Valentim, B.R.V.,Viljoen, K.S.,Santos, A.C., Guedes, A., 2019.Separation of unburned carbon from coal conversion ash: Development and assessment of a dry method. Coal Combustion and Gasification Products 11, 89-96.	https://doi.org/10.4177/CCGP-D-19-00002.1
Cruceru M., Improvement of Environmental Protection by Complex Coal Ash Recycling, Plenary Speech in 9th International Conference on ENERGYSYSTEMS, ENVIRONMENT, ENTREPRENEURSHIP and INNOVATION (ICESEEI'20), London, UK, February 22-23, 2020.	https://www.fc.up.pt/charphite/?page_id=143
Peixoto, A. F., Silva, S. M., Costa, P., Santos, A. C., Valentim, B., Lázaro-Martínez, J. M., Freire, C., (inpress). Acid functionalized coal fly ashes: New solid acid catalysts for levulinic acid esterification. Catalysis Today, ###, ###-###.	*DOI: 10.1016/j.cattod.2019.07.038DOI:10.1016/j.cattod.2019.07.038*
Joanna Całus-Moszko, Barbara Białecka, Krzysztof Wierzchowski, Agnieszka Klupa, 2020.Characterization of unburned carbon separated from power plant slag. Journal of Environmental Science.	https://doi.org/10.1007/s13762-020-02655-7
Krzysztof Wierzchowski, Agnieszka Klupa, BarbaraBiałecka, Joanna Całus-Moszko, (in press). Analysis of the possibility of the separation of unburned coal from a selected fly ash. International Journal of Mining Science and Technology.	*In press*
Z. Adamczyk, J. Komorek, Joanna Całus-Moszko,Barbara Białecka, A. Klupa (submitted to Carbon).Characterization Of Graphite Materials Prepared from Coal Combustion Fly Ashes.	*Submitted to Carbon*
Badenhorst, C., Wagner, N., Viljoen, K., Valentim, B., (submitted). A review of natural graphite occurrence and mining in southern Africa. Minerals ###, ###-###.	*Submitted to Minerals*

Badenhorst, C. J., Wagner, N. J., Valentim, B. R. V.,Santos, A. C., Guedes, A., Bialecka, B., Calus-Moszko,J., Popescu, L., Cruceru, M., Predeanu, G., Viljoen, K.,S.,Lázaro-Martínez, J. M., Abagiu, T. A., 2020.Graphitized char from coal ash. Fuel, ###-###.	*In preparation*
Fernandes, D. M., Santos, A.C., Badenhorst, C. J.,Wagner, N. J., C., Guedes, A., Bialecka, B., Calus-Moszko, J., Popescu, L., Cruceru, M., Predeanu, G.,Viljoen, K., S., Lázaro-Martínez, J. M., Abagiu, T. A.,Valentim, B., Freire, C., "Coal char recovered from fly and bottom ash as promising ORR electrocatalysts", ACS Sustainable Chemistry & Engineering.	*In preparation*
Nunes, M., Santos, A.C., Valentim, B., Freire, C., "Coalchar derived electrocatalysts for the oxygen reduction reaction", submitted in Journal of the Electrochemical Society.	*In preparation*
Pereira, C., Nunes, M. Santos, A.C., Valentim, B.,Freire, C., "Coal fly ashes as electro-Fenton catalysts for water pollutants degradation", submitted in Journal of Environmental Sciences.	*In preparation*

❖ Project COGITO-MIN:

Title	Link (doi or similar)
Underground Vertical Seismic Profiling with Conventional and Fiber-Optic Systems for Exploration in the Kylylahti Polymetallic Mine, Eastern Finland. Riedel, M., Cosma, C., Enescu, N., Koivisto, E., Komminaho, K., Vaittinen, K., and Malinowski, M. Minerals; open access; 2018.	*https://www.mdpi.com/2075-163X/8/11/538* *DOI: 10.3390/min8110538*
AUTOMATIC 3D ILLUMINATION-DIAGNOSIS METHOD FOR LARGE-N ARRAYS: ROBUST DATA SCANNER AND MACHINE-LEARNING FEATURE PROVIDER. Chamarczuk, M., Malinowski, M., Nishitsuji, Y., Thorbecke, J., Koivisto, E., Heinonen, S., Juurela, S., Mężyk, M., and Draganov, D. Geophysics; 2018/2019.	*https://library.seg.org/doi/10.1190/geo2018-0504.1* *DOI: 10.1190/geo2018-0504.1*
Cost-Effective Seismic Exploration: 2D Reflection Imaging at the Kylylahti Massive Sulfide Deposit, Finland. Heinonen, S., Malinowski, M., Hloušek, F., Gislason, G., Buske, S., Koivisto, E., and Wojdyla, M. Minerals; open access; 2019.	*https://www.mdpi.com/2075-163X/9/5/263* *DOI: 10.3390/min9050263*
Sparse 3D Seismic Imaging in the Kylylahti Mine Area, Eastern Finland: Comparison of Time Versus Depth Approach. Singh, B., Malinowski, M., Hloušek, F., Koivisto, E., Heinonen, S., Hellwig, O., Buske, S., Chamarczuk, M., and Juurela, S. Minerals; open access; 2019.	*https://www.mdpi.com/2075-163X/9/5/305* *DOI: 10.3390/min9050305*
Talk: New tools for deep mineral exploration: Insights from the field work stage of the COGITO-MIN project. E. Koivisto, M. Malinowski, S. Heinonen, C. Cosma, N. Enescu, S. Juurela, J. Juurela, T. Törmälehto, K. Vaittinen and M. Wojdyła. Lithosphere 2016 Symposium. 9-11.11.2016, Espoo, Finland.	Link to abstract volume: open access (extended abstract): *http://www.seismo.helsinki.fi/pdf/Lito2016.pdf*

Poster: COGITO-MIN seismic reflection profiling in Polvijärvi: Insight into the first results. G. Gislason, S. Heinonen, M. Malinowski, E. Koivisto, L. Sito, P. Targosz, M.Wojdyla, J. Juurela, S. Juurela, T. Törmälehto and K. Vaittinen. Lithosphere 2016 Symposium. 9-11.11.2016, Espoo, Finland.	Link to abstract volume: open access (extended abstract): *http://www.seismo.helsinki.fi/pdf/Lito2016.pdf*
Poster: The seismic signature of the Kylylahti deposit: Initial results from new petrophysical measurements. T. Luhta, S. Mertanen, E. Koivisto, S. Heinonen, T. Törmälehto and I. Kukkonen. Lithosphere 2016 Symposium. 9-11.11.2016, Espoo, Finland.	Link to abstract volume: open access (extended abstract): *http://www.seismo.helsinki.fi/pdf/Lito2016.pdf*
Poster: Passive seismic interferometry applied to hardrock exploration: a case study from Kylylahti mine (Finland). Chamarczuk, M., Malinowski, M. and the COGITO-MIN Working Group. 5-9.06.2017, Cargese, Korsyka.	
Poster: Passive seismic interferometry applied to hardrock exploration: a case study from Kylylahti mine (Finland). Chamarczuk, M., Malinowski, M. and the COGITO-MIN Working Group. 10-14.07.2017, Oxford, UK.	
Talk: Passive seismic interferometry for subsurface imaging in an active mine environment: case study from the Kylylahti Cu-Au-Zn mine, Finland. Chamarczuk, M., Malinowski, M., Koivisto, E., Heinonen, S., Juurela, S. and the COGITO-MIN Working Group. Exploration`17 Seismic Methods & Exploration Workshop. 26.10.2017, Toronto, Canada.	Link to abstract volume: open access (extended abstract): *http://www.dmec.ca/DMEC/media/Workshops/Seismic%20Methods%20and%20Exploration/Seismic-Methods-Exploration-Workshop-Papers.pdf*
Invited Talk: Seismic interferometry: cost-effective solution for mineral exploration? Malinowski, M., Chamarczuk, M. Exploration`17 Seismic Methods & Exploration Workshop 26.10.2017, Toronto, Canada.	Link to abstract volume: open access (extended abstract): *http://www.dmec.ca/DMEC/media/Workshops/Seismic%20Methods%20and%20Exploration/Seismic-Methods-Exploration-Workshop-Papers.pdf*
Talk: Active source seismic imaging in the Kylylahti Cu-Au-Zn mine area, Finland. Heinonen, S., Malinowski, M., Gislason, G., Danaei, S., Koivisto, E., Juurela, S. and the COGITO-MIN Working Group Exploration`17 Seismic Methods & Exploration Workshop. 26.10.2017, Toronto, Canada.	Link to abstract volume: open access (extended abstract): *http://www.dmec.ca/DMEC/media/Workshops/Seismic%20Methods%20and%20Exploration/Seismic-Methods-Exploration-Workshop-Papers.pdf*
Talk: Seismic imaging of the Kylylahti Cu-Au-Zn ore deposit using conventional and DAS VSP measurements supported by 3D full-waveform seismic modelling. Riedel, M., Cosma, C., Komminaho, K., Enescu, N., Koivisto, E., Malinowski, M., Luhta, T., Juurela, S. and the COGITO-MIN Working Group. Exploration`17 Seismic Methods & Exploration Workshop. 26.10.2017, Toronto, Canada.	Link to abstract volume: open access (extended abstract) : *http://www.dmec.ca/DMEC/media/Workshops/Seismic%20Methods%20and%20Exploration/Seismic-Methods-Exploration-Workshop-Papers.pdf*
Talk: Towards adapting seismic interferometry to retrieve body-wave reflections for mineral exploration: the passive seismic experiment in the KylylahtiCu-Au-Zn mine area, Finland.	

M. Chamarczuk, M. Malinowski, D. Draganov, E. Koivisto, S. Heinonen, S. Juurela and the COGITO-MIN Working Group. EGU2018; 8.-13.4.2018, Vienna, Austria.	
Poster: Seismic reflection profiling in the Kylylahti Cu-Au-Zn mine area, Finland. Heinonen, S., Malinowski, M., Gislason, G., & Koivisto, E. EGU2018. 8.-13.4.2018, Vienna, Austria.	
Talk: Testing of New, Low-cost Seismic Exploration Approaches at Kylylahti Polymetallic Mine Site, Eastern Finland. Koivisto, E., Malinowski, M., Heinonen, S., Cosma, C., Enescu, N., Juurela, S., Wojdyla, M., Chamarczuk, M., Riedel, M. and the COGITO-MIN Working Group. EAGE NSG 2018 Workshop: Worldwide Mineral Exploration Challenges and Cost-Effective Geophysical Methods. 9.9.2018, Porto, Portugal.	Link to the event: *https://events.eage.org/en/2018/2nd-conference-on-geophysics-for-mineral-exploration-and-mining/technical-programme/workshop/workshop-1*
Poster: Vertical Seismic Profiling in the Kylylahti polymetallic mine using conventional and fiber-optic systems. Riedel, M. and the COGITO-MIN Working Group. EAGE NSG 2018 Workshop: Worldwide Mineral Exploration Challenges and Cost-Effective Geophysical Methods. 9.9.2018, Porto, Portugal.	Link to the event: *https://events.eage.org/en/2018/2nd-conference-on-geophysics-for-mineral-exploration-and-mining/technical-programme/workshop/workshop-1*
Poster: Seismic interferometry reflection imaging for mineral exploration using ambient noise recorded with large-N geophone array. Chamarczuk, M. and the COGITO-MIN Working Group. EAGE NSG 2018 Workshop: Worldwide Mineral Exploration Challenges and Cost-Effective Geophysical Methods. 9.9.2018, Porto, Portugal.	Link to the event: *https://events.eage.org/en/2018/2nd-conference-on-geophysics-for-mineral-exploration-and-mining/technical-programme/workshop/workshop-1*
Poster: Passive Seismic Three-Component Interferometry Experiment at the Kylylahti Mine Site, Eastern Finland Väkevä, S., E. Koivisto, M. Chamarczuk, M. Malinowski and the COGITO-MIN Working Group EAGE NSG 2018. 9.-13.9.2018, Porto, Portugal.	Link to extended abstract: *http://earthdoc.eage.org/publication/publicationdetails/?publication=94516* DOI: 10.3997/2214-4609.201802715
Poster: From regional seismics to high-resolution resource delineation: Example from the Outokumpu ore district, Eastern Finland Koivisto, E., Malinowski, M., Heinonen, S., Cosma, C., Vaittinen, K, Wojdyla, M., Chamarczuk, M., Riedel, M., Kukkonen, I. and the COGITO-MIN Working Group EAGE NSG 2018. 9.-13.9.2018, Porto, Portugal	Link to extended abstract: *http://www.earthdoc.org/publication/publicationdetails/?publication=94517* DOI: 10.3997/2214-4609.201802716
Poster: Distributed Acoustic Sensing versus conventional VSP imaging of the Kylylahti polymetallic deposit Riedel, M., Cosma, C., Enescu, N., Koivisto, E., Komminaho, K., Vaittinen, K., Malinowski, M. EAGE NSG 2018. 9.-13.9.2018, Porto, Portugal.	Link to extended abstract: *http://www.earthdoc.org/publication/publicationdetails/?publication=94545* DOI: 10.3997/2214-4609.201802744
Talk: Seismic interferometry for mineral exploration: passive seismic experiment over Kylylahti mine area, Finland	Link to extended abstract: *http://earthdoc.eage.org/publication/publicationdetails/?publication=94504*

M. Chamarczuk, M. Malinowski, D. Draganov, E. Koivisto, S. Heinonen, S. Juurela and the COGITO-MIN Working Group EAGE NSG 2018. 9.-13.9.2018, Porto, Portugal.	DOI: 10.3997/2214-4609.201802703
Poster: Seismic exploration in the Kylylahti Cu-Au-Zn mining area: comparison of time and depth imaging approaches Heinonen S, Malinowski M, Hlousek F, Gislason G, Koivisto E, Buske S, The COGITO-MIN Working Group EAGE NSG 2018. 9.-13.9.2018, Porto, Portugal.	Link to extended abstract: *http://earthdoc.eage.org/publication/publicationdetails/?publication=94514* DOI: 10.3997/2214-4609.201802713
Talk: 3C Seismic Interferometry at the Polymetallic Kylylahti Deposit, Outokumpu District, Finland S. Väkevä, E. Koivisto, G. Hillers, M. Chamarczuk and M. Malinowski Lithosphere 2018 Symposium. 14.-15.11.2018, Oulu, Finland.	Link to abstract volume: open access (extended abstract): *http://www.seismo.helsinki.fi/ilp/lito2018/Lito2018_Abstract_Volume_color.pdf*
Talk: COGITO-MIN seismic reflection profiling for mineral exploration in Polvijärvi, Finland S.Heinonen, M. Malinowski, G. Gislason, F. Hlousek, S. Buske and E. Koivisto Lithosphere 2018 Symposium. 14.-15.11.2018, Oulu, Finland.	Link to abstract volume: open access (extended abstract): *http://www.seismo.helsinki.fi/ilp/lito2018/Lito2018_Abstract_Volume_color.pdf*
Talk: Testing of seismic mineral exploration methods at different scales at the Kylylahti polymetallic mine site, Eastern Finland. E. Koivisto, M. Malinowski, S. Heinonen, M. Riedel, M. Chamarczuk, C. Cosma, K. Vaittinen, M. Wojdyła and the COGITO-MIN Working Group. Lithosphere 2018 Symposium. 14.-15.11.2018, Oulu, Finland.	Link to abstract volume: open access (extended abstract): *http://www.seismo.helsinki.fi/ilp/lito2018/Lito2018_Abstract_Volume_color.pdf*

❖ Project HITEM:

Title	Link (doi or similar)
Advanced HTS DC SQUIDs with Step-Edge Josephson Junctions for Geophysical Applications.	*10.1109/TASC.2018.2820056*

❖ Project REMinE:

Title	Link (doi or similar)
Bi-level depth assessment of an abandoned tailings dam aiming its reprocessing for recovery of valuable metals.	*https://doi.org/10.1016/j.mineng.2018.12.016*
Tailings reprocessing from Cabeço do Pião dam in Central Portugal: A kinetic approach of experimental da	*https://doi.org/10.1016/j.jsm.2018.07.001*
Design optimization of a tailings reprocessing: Tungsten and zinc.	*https://doi.org/10.5593/sgem2018/2.1/S07.03*
Improving Resource Efficiency and Minimize Environmental Footprint – a case study preliminary results.	*http://www.imwa.info/docs/imwa_2017/IMWA2017_Albuquerque_1240.pdf*
Tailings: re-processing or safe storage? A proposal of optimization by multi-objective criteria.	*https://cest.gnest.org/sites/default/files/presentation_file_list/cest2017_01235_poster_paper.pdf*
Physical chemical characterization of historical mining waste.	*https://doi.org/10.1051/e3sconf/201712301031*

Design optimization of a tailings reprocessing: tungsten and zinc recovery.	https://doi.org./10.55932/sgem2018/2.1
A Sustainable Tailings Reprocessing Project: A case of study in Portugal.	https://doi.org./10.55932/sgem2018/1.4
Bi-level depth assessment of an abandoned tailings dam aiming its reprocessing for recovery of valuable metals.	http://www.min-eng.com/sustainableminerals18/paps.html
Recovery of Arsenic by flotation – A case study on the tailings of Cabeço Do Pião.	https://sigarra.up.pt/feup/pt/pub_geral.pub_view?pi_pub_base_id=2538
Are tailings sources ofsecondary raw materials?	https://drive.google.com/open?id=16qDEzOFQ8eadQnIoYrmDj0stJULh1VlE
Mining wastes in a circular Economy.	https://drive.google.com/open?id=14BmV38WHX5OzGIfvEWqsNLe3wxhieRnh
Historical mine waste characterization: an approach for environmental wastes management and metals recovery.	https://drive.google.com/file/d/1CCOuExjAiiFDQ0C9Z-6eq75TLzKi71zT/view?usp=sharing
Circular statistical models in the studies of the atmospheric dispersion of particles from mining tailings dams.	https://drive.google.com/file/d/1Y2D2b_-4BlUmDeNXemCyNYcXCGubqc4O/view?usp=sharing
Study of the zinc leaching as a method for the recovery of tailings from Cabeço do Pião.	http://hdl.handle.net/10216/107415
Remining and Restructure of a Tailing Deposit - Technical Feasibility.	http://hdl.handle.net/10216/105289
Geochemical Characterization of Historical W, Cu and F Skarn Tailings at Yxsjöberg, Sweden (2018). With focus on scheelite weathering and tungsten (W) mobility.	http://ltu.diva-portal.org/smash/get/diva2:1249767/FULLTEXT01.pd
Geochemical Characterization of W, Cu and F Skarn Tailings at Yxsjöberg, Sweden. J. Geochem Explor. 194:266-279.	*DOI: 10.1016/j.gexplo.2018.09.001*
Metal Release from Acidic and Near-Neutral pH-Conditions in Historical W, Cu and F Skarn Tailings at Yxsjöberg, Sweden.	https://www.imwa.info/docs/imwa_2018/IMWA2018_Hallstrom_351.pdf
Strontium (87Sr/86Sr) isotopes: A tracer for geochemical processes in mineralogically-complex mine wastes.	https://www.sciencedirect.com/science/article/pii/S0883292718303081?via%3Dihub
Physical chemical characterization of historical mining waste and ARD prediction tests.	*E3S Web of Conferences, 2017BDI10.1051/e3sconf/20171801031*
The effect of oxidative processes on the migration of elements in historical tailings.	*Bulletin of Romanian Chemical Engineering Society Nr2/2018ISSN 2360-4697*
THE OXIDATIVE PROCESSES AND MIGRATION OF ELEMENTS IN HISTORICAL TAILINGS.	*Proceedings- XIII International Mineral Processing and Recycling Conference ISBN 978-86-6305-091-4*
Characterization and Feasible Physical Separation Methods for Yxsjöberg Historical Tungsten Ore Tailings. Luleå Conference in Minerals Engineering 2019.	https://www.ltu.se/cms_fs/1.79916!/file/Preliminary%20list%20of%20papers%202019.pdf
Feasibility of gravity and magnetic separation for Yxsjöberg historical tungsten ore tailings. Physical separation ’19.	http://www.min-eng.com/physicalseparation19/paps.html

ANNEX II:

Funded project	Title	Reference
Project BATRE-ARES: **Patent**	Ionic liquid-acid aqueous systems. Papaiconomou N., Coutinho J., Gras M., Billard I.,	WO 2018/087364 Al. Published 17/05/2018 *https://patents.google.com/patent/WO2018087364A1/fr?q=syst%C3%A8me&q=biphasique&q=aqueux&oq=syst%C3%A8me+biphasique+aqueux*
Project COGITO-MIN: **Theses**	Petrophysical properties of the Kylylahti Cu-Au-Zn sulphide mineralization and its host rocks. Luhta, T.; University of Helsinki; MSc; Publication: 2019.	*https://helda.helsinki.fi/handle/10138/302130*
Project COGITO-MIN: **Theses**	Using Three-Component Data for Seismic Interferometry Studies at the Kylylahti Mine, Eastern Finland. Väkevä, S.; University of Helsinki; MSc; Publication: 2019.	*https://helda.helsinki.fi/handle/10138/302127*
Project COGITO-MIN: **Theses**	2 PhD theses underway at IG PAS. Chamarczuk, M. and Singh, B.; IG PAS; PhD. Publication 2020-2022.	