MINERAL PROCESSING AND EXTRACTIVE METALLURGY FOR MINING AND RECYCLING INNOVATION ASSOCIATION

PROMETIA

Member directory 2024

Profile
Expertise
Facilities & services

www.prometia.eu

To address the challenge of the strategic raw material supply in Europe, the development of innovative processes that support the emergence of a European industry in charge of mining and recycling its own strategic materials - and gain its independence in the field - is of paramount importance.

The aim is not only to develop processes that treat versatile and low-grade materials or recycle waste that have a complex chemical formulation, but also to have environment-friendly mature enough processes to be implemented at the industrial scale. Such a demanding goal requires the implication of the whole scientific and technological community, from basic research to process demonstration, in close connection with industries. This has been clearly stated in the European Innovation Partnership on Raw Materials.

Today, about 40 partners covering the whole spectrum from basic research to industrial application are joining their efforts to promote mineral processing and extractive metallurgy for mining and recycling through the PROMETIA association.

PROMETIA was established on 16 December 2014. It gathers partners from the recycling and mining industry, academic and research organisations and most of the European demonstration platforms. It aims to ease the interactions between R&D, demonstration platforms and industry to promote the development of innovative efficient and clean processes, the cornerstone for future European industries in this area.

In this brochure, you will find more information on our partners, their competences, expertise and key infrastructures. Do not hesitate to contact them if you want to build successful R&D projects!

Stéphane Bourg
President

Alexandra Ribeiro
Vice President

Patrick d'Hugues
Executive Committee Chairman

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AdMiRIS
Advanced Minerals and Recycling Industrial Solutions I.K.E
Athens, Greece

ABOUT

AdMiRIS is a company founded by people with long hands-on and managerial experience in Minerals, Mining and Metallurgy business and technology.

Based in Athens, Greece, AdMiRIS is specialised in evaluating and transferring technology solutions from academia to industry, utilising its vast international network of connections and deep understanding of a multitude of businesses that are using minerals as raw materials.

AdMiRIS, participates in several H2020 programs providing its expertise in mineral-based raw materials, business planning and LCA.

EXPERTISE

Our employees have more than 50 years combined expertise in minerals and metallurgy business and research.

The company is specialised in raw materials resources identification, market analysis, relevant products and solutions development, covering the needs of industries like polymers, paints, coatings, agribusiness, glass, ceramics, etc.

Our deep understanding of metallurgical processes makes AdMiRIS an ideal partner for metallurgies seeking innovative solutions that would increase their cost efficiency and sustainability.

With leading LCA tools, AdMiRIS is helping its customer implement optimum solutions for their daily operations and strategic reorientation.

Based on their business expertise, AdMiRIS evaluates technologies and products and supports their commercialisation with detailed cost – benefit analysis, value-to-customer based pricing and reliable business plans. Transforming processes to businesses is their competitive advantage.

SERVICES

AdMiRIS main services are:

- LCA analysis (GABI)
- Business Plans
- Strategic Sourcing
- Metallurgical Technology
- Products and Processes development and commercialisation

MORE INFORMATION

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AMIRA

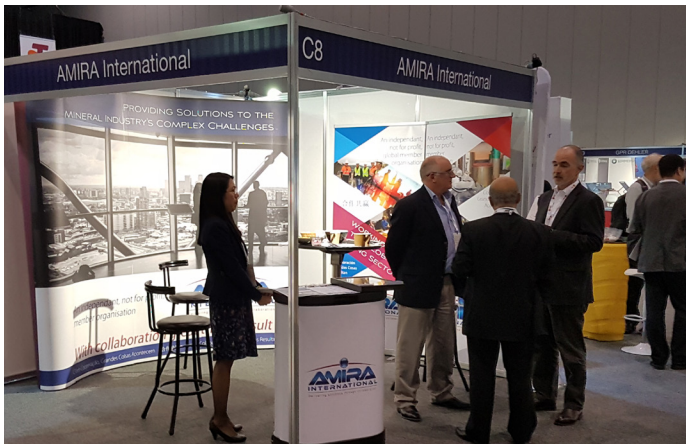
AMIRA International Mineral Industry Research Associations NPC

Global organisation with offices in Johannesburg (South Africa), Melbourne and Perth (Australia), Denver (USA) & Santiago (Chile)

ABOUT

AMIRA International is a not-for-profit member-based company which develops, promotes and oversees collaboratively funded research projects in mineral processing/extractive metallurgy, exploration, mining, and sustainability with international research institutions for the benefit of our members in the global mineral industry. We have been in operation since 1959 and since then we have successfully managed over 700 projects to the benefit of the global mining industry. AMIRA International currently has more than 60 member companies from around the world who are either mineral or metal producers or suppliers to these extractive industries.

AMIRA's role is to assist members by providing solutions to technical problems through the development and implementation of jointly funded research projects.



EXPERTISE

AMIRA International's value proposition for its members is "*developing solutions through collaboration.*"

AMIRA International has more than 57 years of research project experience in the minerals industry and has many contacts and a wide company and research network in the major mining jurisdictions around the globe. AMIRA International has partnered with over 60 different research institutions around the globe and can access many leading academics to assist with developing solutions to mineral industry challenges. AMIRA International believes this experience will add value to PROMETIA and to its members and can assist with the development of quality of research projects that are aligned with industry needs and to minimising "reinventing the wheel".

AMIRA International also has a recognised track record and capability in exploration geosciences, mining, extractive metallurgy & mineral processing, and sustainability that may assist PROMETIA develop projects in the relevant disciplines should it choose to develop projects in these areas for Europe in the future. AMIRA International currently has a portfolio of 13 projects in management, with 14 projects in various stages of development.

SERVICES

AMIRA International currently has more than 60 member companies from around the world who are either mineral or metal producers or suppliers to these extractive industries. AMIRA International has offices and Program Managers in Johannesburg (South Africa), Denver (USA), Santiago (Chile), and in Perth and Melbourne in Australia.

AMIRA International has many years experience in the development and preparation of research project proposals in the mineral industry and then uses its vast network to try and secure the necessary funding to start the project. Once sufficient funding has been secured AMIRA has an oversight which includes ensuring that all contractual arrangements are in place, acting as sponsor liaison, project coordination, report review and distribution, and the organisation and chairing of sponsors' review meetings. AMIRA's responsibility does not take on the direct project leadership and management of the research team which is the responsibility of the Project Leader from the lead Research provider institution.

MORE INFORMATION

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AMPHOS 21
Amphos 21 Consulting, S.L.
Barcelona, Spain

ABOUT

The company started its activity in 1994 and adopted its current denomination, Amphos 21, in 2007. Since its inception, Amphos 21 has developed its activity at an international level, with a special focus on R&D projects.

They offer scientific, technical and strategic consulting in different fields related to the environment, in particular Nuclear, Mining, Water, Sustainability and Oil&Gas.

Amphos 21 consists of 4 companies established in Spain (1994), Chile (2009), Peru (2012) and France (2012). They develop studies and projects in many countries, in addition to the countries of operation: Sweden, Finland, Germany, UK, USA, Belgium, Canada, Japan, Panama, Colombia, etc.

EXPERTISE
MARKETS

Nuclear: Amphos 21 offers consultancy in the entire nuclear fuel cycle as well as in all the issues related to radioactive waste management. More than 25 years of expertise as international consultants are behind us.

Mining: They offer consulting engineering services to the mining industry in water resources management in the various stages of the mining process. Our services are aimed at generating pragmatic solutions whose design is based on a thorough understanding of the system and in continuous communication with the client.

Water: Amphos 21 offers consulting services throughout the water cycle, with specialised services and high added value in the fields of hydrology, hydrogeology, hydrochemistry, numerical modelling, environmental impact assessment and public participation. We also offer expert advice on the characterisation and management of soil, groundwater and contaminated sites.

Sustainability: Amphos 21 offers consulting services aimed at promoting sustainable development for both the public administration and the private sector.

Oil&Gas: They offer consulting services in geochemistry, hydrogeology, mathematical models, social risk perception and public participation to companies that develop and manage projects related to exploration, extraction, transportation and oil and gas storage, including the geological storage of CO_2.

R&D: R&D is the basis of the company's development. They have been carrying out research and development activities since their birth in 1994, either as self-supported activity or in collaboration with clients. As a transversal activity to all of their market sectors, they develop R&D projects in a vast majority of their activities.

Advanced numerical modelling: Numerical modelling is a key tool in geosciences and engineering. It is very useful for gaining additional information in physical-chemical processes, to predict the behaviour of complex geological systems, to assess the performance of engineering works, as well as to demonstrate the efficiency of new technologies and prototypes.

SERVICES

Nuclear
- Experimental and modelling studies
- Radioactive waste repository performance assessment & siting
- Environmental and radiological impact of radioactive waste storage and disposal facilities
- Expert advice to authorities in waste management related issues and risk assessment
- Consulting in NORM and TENORM issues
- Risk perception and risk communication

Mining
- Acid Mine Drainage
- Mine Hydrology
- Hydrometallurgy
- Water Resources
- Environmental Hydrogeochemistry
- Engineering
- Mine closure
- Environmental Impact Assessment

Water
- Assessment and management of water resources
- Water quality and pollution control
- Water and environmental strategies
- Groundwater and engineering services
- Management plans of contaminated sites
- Risk analysis, file management
- Environmental Due Dilligences (EDD)

Sustainability
- Waste and pollutants management
- Environmental management and policy development
- Environmental and energy policies
- Strategic environmental communication
- Green economy and sustainable development

Oil&Gas
- Research, characterisation and development of geoscientific studies
- Mathematical modelling and multiphysics process simulation
- R&D and innovation projects
- Geological monitoring and characterising
- Hydrogeology and geochemistry
- CO_2 Recovery
- Risk Analysis
- Environmental impact studies
- Public communication and perception

Amphos 21 has a multidisciplinary team of over 100 highly qualified professionals in various disciplines, such as chemistry, geology, engineering, environmental science, hydrogeology, geochemistry, physics, biology, environmental communication, economics, information and communication technologies.

MORE INFORMATION
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BT
BiotaTeC OÜ
Tallinn, Estonia

ABOUT

BiotaTec is an SME developing and licensing novel biotreatment solutions for the maximum valorisation of different low-grade Ores and Wastes/Tailings, Black and Oil Shales, Batteries and WEEE via generation of methane gas and metals extraction.

Biomining Centre at campus of University of Tartu.

- **Proud participant in:**
  - H2020 SME phase 1 in 2017
  - LIFE2017/ENV-000216 with Reydesa Recycling
  - EIT Raw Materials Accelerator 2018
  - Various SC05 proposals
- **Tenders won > 0,8 M€**
- **R&D grants > 0,9 M€**
- **2 agreements (> 165 000€) with Estonian Ministry of Environment in assessing the possibilities of biomining**
- **Organiser of first Estonian biomining symposium on Estonian Argillite in 2014.**
- **PCT at national phases - EU, Jordan, Australia, Canada, US**
- **Seed of 0,6M€ from Estonian State direct investment fund in 2010**
- **35% of the shares that belong to Estonian State are managed by VC Fund selected by EIB experts.**

EXPERTISE

BiotaTec is strongly convinced that while targeting at the maximum yield for metals, an emphasis on valorising the ore's & waste's organics for energy production is an important factor for success in circular economy.

In adapting BiotaTec novel solution for organics containing low-grade ore / waste a biogenic methane gas is produced in anaerobic environment and certain metal compounds are released from organic complexes; in aerobic environment, metals in the form of sulphides are leached out from the core.

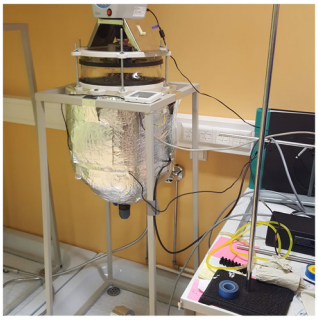
The unique feature of the method is the use of organometallic compounds degradation products for simultaneous methane production, i.e. energy generation.

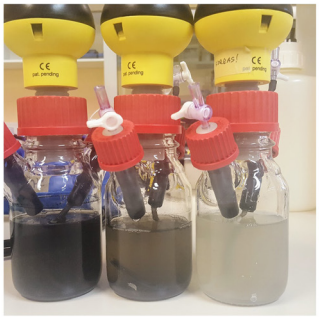
Accumulation of fermentation metabolites (NH3, H2S, acetate, H2) is avoided by syntrophic action of acetogens, sulphate reducers and methanogens. Although utilisation of hydrocarbons by aerobic microorganisms is also possible there is no other way for complex use of most metabolites.

FACILITIES & SERVICES

BiotaTec offers biotreatment development services for different low-grade ores/wastes in their Biomining Centre facilities; various tests will be performed both aerobically and anaerobically from scale 0.5L up to scale 200L. Pilot scale bioreactors will be built in 2019 at the industrial environment.

Their interdisciplinary multinational highly experienced team covers microbiology, chemistry, geology, chemical engineering, industrial upscaling, etc.





MORE INFORMATION

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BRGM
Bureau de Recherches Géologiques et Minières
Orléans, France

ABOUT

The BRGM is the French geological survey and France's public reference institution in earth science applications for the management of surface and subsurface resources and risks. Its activities are geared to scientific research, support to public policy development, international cooperation and mine safety.

Its role:

- Understanding geological phenomena and associated risks
- Developing new methodologies and techniques
- Producing and distributing data to support the management of soils, subsoils and their resources
- Delivering the necessary tools to support the management of soils, subsoils and their resources, risk prevention and policy responses to climate changes

BRGM employs over 1050 people, including more than 700 researchers and engineers. Its total income from its activities was €144 M in 2014.

The Water, Environment and Ecotechnologies Division works towards better management of water, polluted sites and soils, waste and mineral resources. This division draws up methodological guides and technical standards, develops decision-aid tools, and develops «clean technologies» for treating water, wastes and raw material. The BRGM Waste and Raw Material Unit belongs to this Division and is involved in PROMETIA.

EXPERTISE

The BRGM Waste and Raw Material Unit is an R&D team of 16 people (process and environmental engineers & researchers) that works on process development & environmental analysis (including LCA) in the field of mining waste management, recycling, water management and primary resources treatment (mineral processing & extractive metallurgy).

The BRGM team involved in PROMETIA has a strong experience in European projects (FP6: BIOMINE, Bioshale, FP7: PROMINE, H2020: Biomore, FAME, HISER). It is actively involved in research projects focusing on the development of innovative techniques for mineral processing in the mining industry (including a unique expertise in biohydrometallurgy). BRGM is also involved in projects dealing with the development and the demonstration of processes for the recycling of electronic waste (REWARD) and of mining and metallurgical wastes (ProMine, ENVIREE, EXTRAVAN).

The team works on the following targets :

- Primary resources: metal ores, unconventional resources (polymineral and polymetallic concentrates, tailings), industrial minerals
  Secondary resources: post-consumer waste (WEEE, ELV etc.), metallurgic waste (slag, fly ash etc., construction & demolition waste
- Effluent, industrial sludge and sediment

Their expertise can be described as follows: Characterisation & sampling; Process development & optimisation (comminution, concentration, thermal treatment, hydrometallurgy, biological treatment); Management of process water; Technical & environmental assessment of processes and resources and waste management.

FACILITIES & SERVICES

Laboratory and pilot scale facilities on mineral processing & biohydrometallurgy. Development and optimisation of processes through different approaches: experimental works, simulation and modelling.

- Access to multi-scale experimental and technical means from laboratory to pilot cale (2000 m^2). From grams to several tons: Samplers; Crushers; Gravity separators Magnetic separators Eddy current separator; Flotation cells; (Bio)leaching reactors; Furnaces

- Process simulation and modelling tools: HSC, USIMPAC, COMSOL, LCA-SIMAPRO, Environmental evaluation

- Analytical facility for characterisation and analysis of solids and liquids: Significant volume DTA/GTA (up to 100 g); Portable IR, fluoX; Texture analysis, Chemical analysis, etc.

MORE INFORMATION

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CEA / ISEC

French Alternative Energies and Atomic Energy Commission / Science & Technology Institute for a Circular Economy of Low Carbon Energy, Chusclan, France

ABOUT

CEA / ISEC was founded in 2020 with the purpose of mastering the materials cycle for a successful energy transition, contributing to reaching carbon neutrality in 2050 as well as national strategic independence on resources and materials.

ISEC is based at CEA Marcoule. It gathers CEA historical R&D activities (nuclear fuel cycle, nuclear waste management such as separation processes used to recycle uranium and plutonium in La Hague reprocessing plants, conditioning matrix) to transfer proven expertise towards other materials cycles. It develops three fields of research:

- closing the nuclear fuel cycle in a circular economy approach,
- implementing circular economy for other low-carbon energies (batteries, wind, solar, hydrogene...): life cycle assessment, metals and materials recovering from wastes, collaborations and partnerships with industrials,
- supporting nuclear clean up & dismantling activities and R&D for radioactive waste management (ex. support to Japan for the Fukushima site cleaning).

ISEC is able to draw on the strength of 7 purpose-built technology platforms as well as over 700 scientists, technicians and support staff. ISEC provides expertise with an integrated approach to processes (from fundamental research to industrial transfer). With European and international collaborations, it is also valuable for the training of young foreign researchers.

Besides Prometia and several other European networks, CEA is also member of Metnet.

EXPERTISE

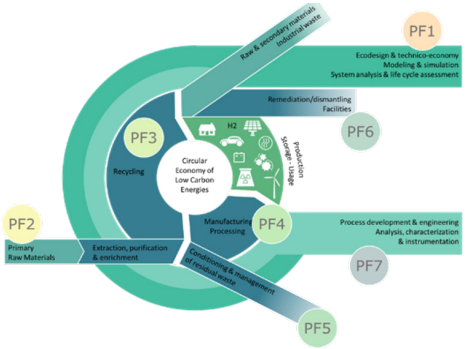
ISEC and CEA Marcoule knowhow are based on:

- closing the cycle in a circular economy approach: front-end cycle - research on the extraction, the purification and the enrichment of uranium, improvement of existing fuel reprocessing and MOX manufacturing processes, research on the multi-recycling of fuel for the future generations of reactors,
- knowledge in solution chemistry of numerous elements of interest existing in spent nuclear fuel like actinides, rare earths and platinum group metals, as well as in secondary material deposits,
- proven separation process development method based on an integrated approach of the core process, head-end and ancillary steps, up-scaling with a strong coupling between modelling and experience,
- Large type of separation processes like solvent extraction, solid separation, coprecipitation…,
- Clean-up and dismantling of the site's oldest facilities and management of their waste,
- Transversal skills (multi-scale modelling, expertise in analysis),
- Multiple and high-performing experimental means (experimental and analytical laboratories, test-loops, modelling and simulation platforms),
- Eco-conception approach for minimising environmental footprints,
- Monitoring methodology based on datamining and data refining for analysing the materials cycle.

FACILITIES & SERVICES

With three research facilities, CEA Marcoule is fully equipped for performing studies from the lab scale up to the process feasibility demonstration at small pilot scale (around 1l/h) covering:

- Extracting molecules design (synthesis, molecular modelling),
- Metals recovery and recycling (tests from batch to continuous),
- Efficient technology development,
- Process modelling and simulation (process code for flowsheet design),
- Process instrumentation,
- Virtual reality room to validate dismantling scenarios and qualify equipment by digital twin, augmented reality technologies for facilitating human interventions in severe environment, dedicated robotic platform to support nuclear clean up & dismantling activities.



PF1: systems engineering and sustainable business model
PF2: production of primary resources and mining processes
PF3: recovering of secondary resources and recycling
PF4: materials and components
PF5: packaging and management of industrial waste
PF6: depollution and deconstruction of industrial sites
PF7: process engineering and instrumentation

MORE INFORMATION

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CEA / Liten

French Alternative Energies and Atomic Energy Commission / Liten, Grenoble, France

ABOUT

Located at CEA Grenoble and INES (Chambéry) centers, CEA / Liten is dedicated to the energy transition. It is spearheading the EU's efforts to limit dependency on fossil fuels and reduce greenhouse gas emissions in three key areas: renewable energy, energy efficiency/ storage and development of materials, spanning the entire value chain from the development of materials to pre-industrialization.

Its activities focus on several key areas: solar energy, network management, batteries storage and hydrogen in order to improve energy efficiency and circular economy approach. CEA-Liten covers a wide range of applications in energy production and distribution, transportation, industrial processes, and environment markets.

CEA / Liten strategic research axes are the following:

- Renewable energy production: high performance photovoltaics, photovoltaics everywhere,
- Storage and flexibility solutions: batteries, hydrogen vector,
- Systems, networks and energy efficiency: energy systems and networks, thermal energy management, power electronics,
- Circular economy: eco-innovative materials and process (additive manufacturing, processes and assemblies, structural electronics), chemistry and recycling, carbon circular economy.

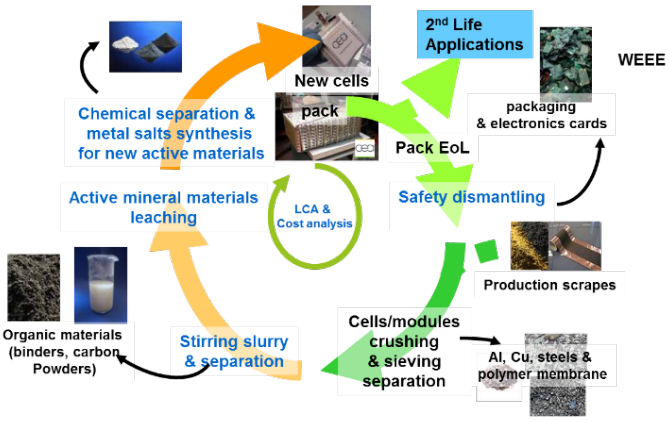
The institute is able to draw on the strength of 12 purpose-built technology platforms as well as over 1000 scientists, technicians and support staff. The combination of this enviable array of equipment and the scientific expertise of CEA-Liten's scientific teams results in a powerful R&D tool that can help overcome complex technological hurdles and help build the products, components and industrial processes of the future.

FACILITIES & SERVICES

CEA Grenoble hosts several technological platforms including industrial tools to support an integrated approach on specific applications. One of them is dedicated to material efficiency where production scrap or EoL products are treated to valorise the most valuable substances contained in it, such as CRM. The secondary raw materials are qualified in other local platforms (Battery, printed electronic, powder metallurgy…)

- Lab scale facilities for recycling (dismantling, material preparation, sorting, hydro/iono-metallurgy, validation & testing of recovered materials)

- Material (nano-)characterisation facilities strongly linked with European installation (ESRF, ILL)



EXPERTISE

CEA / Liten knowhow is based on:

- Material science and engineering driven by applied technological development (from modelling to processing, prototyping & scaling up),
- Eco-design of materials without (or with low content of) CRM,
- Strong teams on fine materials characterisation,
- Integrated approach from material to system applied to technological development (thanks to devoted platforms)
- Technico-economic & environmental assessment (e.g. LCA) on developed technologies.

MORE INFORMATION

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Chalmers
Chalmers University of Technology
Göteborg, Sweden

ABOUT

The Nuclear Chemistry and Industrial Materials Recycling group at Chalmers started its work in the recycling area in the 60s through the works of Professor Jan Rydberg and his co-workers. Activities focused on the treatment of mainly liquid waste waters using solvent extraction. In the 70s the recycling part was separated into companies and did not return until 2007 when the company Stena Metall decided to fund a material recycling chair at Chalmers.

Since then, the recycling activities have grown to a team of about 12 PhD students and 4 senior scientists. The work performed and the personnel are closely linked and partially shared with the nuclear chemistry part of the group. In 2007 the Competence Center Recycling (CCR) was launched.

This centre comprises scientists from all kinds of disciplines such as chemistry, chemical engineering, LCA, practical philosophy, environmental systems analysis, physics, mechanical engineering etc. In this constellation, considerably wider recycling issues can be handled than with only one small department. Thus the industrial involvement in this centre is significant.

EXPERTISE

Our main expertise is solution chemistry and solvent extraction. However, this includes the whole range from estimating and using activity coefficients for optimising processes and basic chemical understanding and speciation all the way to complete process engineering a pilot plant scale.

In addition to the hydrochemical expertise we also have some pyrochemical activities on a more basic science level.

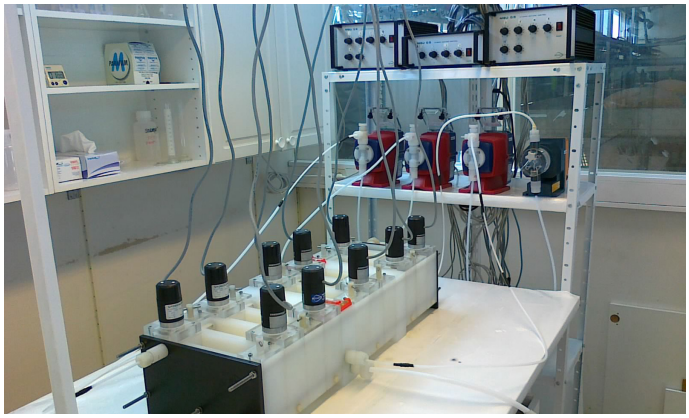
Since we are a licenced radiochemical laboratory, we also have extensive expertise in the handling of radioactive material. This is very useful for e.g. concentration determinations but also for handling of materials that require this kind of licence, i.e. uranium containing minerals.

FACILITIES & SERVICES

The main part of the recycling activities deal with hydochemical processes. To this end, we are equipped with state-of-the-art concentration determination devices such as ICP-MS, ICP-OES, iC and AAS. In addition, we can use radioactive tracers to facilitate a more accurate determination of concentrations in different liquid and solid phases.

On the process side we have normal chemical laboratories but also mixer-settlers and centrifugal contactors for process testing. The former is together with a temperature controlled dissolver and a refiner connected to a complete test bed for a separation process in a smaller pilot scale.

For pyrochemical processing there are several dedicated ovens including some in glove boxes to ensure atmosphere control.



MORE INFORMATION

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CMI
Critical Materials Institute
Ames, Iowa, USA

ABOUT

The Critical Materials Institute is an Energy Innovation Hub funded by the U.S. Department of Energy. CMI focuses on technologies that make better use of materials and eliminate the need for materials that are subject to supply disruptions. These critical materials are essential for American competitiveness in clean energy. Many materials deemed critical by the U.S. Department of Energy are used in modern clean energy technologies, including wind turbines, solar panels, electric vehicles, and energy-efficient lighting. The Department's 2011 Critical Materials Strategy reported that supply challenges for five rare earth metals may affect clean energy technology deployment in the coming years. The Critical Materials Institute focuses on five «critical» rare earths and two «near-critical» materials: dysprosium, terbium, europium, neodymium and yttrium, as well as lithium and tellurium.

The Ames Laboratory leads the CMI team, which includes partners from other national laboratories, universities and industry. Partners can join a various levels, including:

- CMI Affiliates will be informed about CMI research outcomes and provide input to CMI; Affiliates pay an annual fee based on the organisation type, and sign a Membership Agreement.
- CMI Associates may use the unique capabilities and expertise of CMI via DOE-approved contractual mechanisms, such as a Cooperative Research and Development Agreement (CRADA) or a Strategic Partnership Projects (SPP) agreement.
- CMI Team Members have research subcontracts from CMI or are providing cost sharing funds. Requirements include specific research project deliverables within the entity's areas of expertise, based on a scope of work and a negotiated budget, including cost-share as applicable, as approved by the CMI Advisory Board and Director. This level of participation is required to sign CMI's Master Non-disclosure Agreement and the Intellectual Property Management Plan (IPMP). Industrial Team members will have representation on the Industry Council.

EXPERTISE

CMI Director Alex King summarises CMI as doing four things:

- Diversifying supplies. If one source goes offline, we can rely on a different source.
- Developing substitute materials that can meet needs without using the materials we use today.
- Using the available materials more efficiently: reducing waste in manufacturing processes, and increasing the adoption of recycling.
- Forecasting what materials might become critical in the future.

FACILITIES & SERVICES

The Critical Materials Institute created unique facilities that are available for research and collaboration. These include:

- Pilot-Scale Separations Test Bed Facility
- Filtration Test Facility
- Bulk Combinatoric Materials Synthesis Facility
- Rapid Analysis of Combinatoric Sample Arrays
- Ferromagnetic Materials Characterisation Facility
- Thermal Analysis in High Magnetic Fields
- Improved criticality assessment capacity
- Thin-film combinatoric library production facility
- High-throughput analysis
- Electrophoretic deposition capability
- Toxicology test capability
- Rapid magnetic property assessment
- Rapid thermodynamic property assessment
- Micro-x-ray fluorescence analysis capability
- Metal reduction capabilities
- Robotic high-throughput catalyst development system

MORE INFORMATION

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CRM Group
Centre for Research in Metallurgy – CRM Group
Liège, Belgium

ABOUT

CRM Group is a non-for-profit research organisation providing its customers with innovative technological solutions for the processing and manufacturing of metallic materials, from primary and secondary raw materials up to finished products, with a truly holistic process-product approach.

CRM Group is mainly working with industrial partners, with a strong network of more than forty-five members (among which numerous global players) covering the whole value chain of steel, other base metals and associated materials, recycling included.

EXPERTISE

CRM Group has a long experience in scaling-up new production processes and new metallic products from the laboratory scale on which they have initially been developed up to the very large production sizes that are common in the metallurgical sector.

To do so, CRM Group operates unique pilot facilities addressing all the metal production stages, mostly conceived, designed and constructed by its own engineering department. Apart from its numerous R&I projects with industrial partners, CRM Group is also actively involved in regional and European networks dealing with Resource Efficiency : CRM Group coordinates the 'Pyrometallurgy' axis of the Walloon mega-project 'Reverse Metallurgy', aiming to develop unique technologies for the recycling and valorisation of waste metals in the spirit of Circular Economy and Sustainable Development, and to create value for regional economy and companies; at European level, CRM Group is member a.o. of the European Steel Technology Platform (ESTEP), the European A.SPIRE association and EIT Raw Materials.

FACILITIES & SERVICES

As a member of the Metnet network of pilot plants within Prometia, CRM Group may offer access to its wide lab and pilot infrastructure in the following fields :
- primary and secondary raw materials pre-processing : drying, intensive mixing, shredding, grinding, crushing, agglomeration (roll press briquetting, compaction, extrusion)
- thermo-chemical treatment of solids (calcination, direct reduction, pyrolysis, gasification under low or high pressure,…) in pilot facilities like : grate sintering, rotary kiln, multiple and rotary hearth furnaces, fluidized beds, heating furnace under vacuum, versatile fixed bed shaft furnace
- remelting or smelting in : a rotary tilting furnace (for Al or Zn), induction melting furnaces (atmospheric or vacuum - for steel and ferro-alloys), and coming soon, a quite unique and versatile 125 litre plasma furnace (for CRM's recovery by smelting or fuming, and for liquid slag processing and granulation)
- metal solidification and processing (casting, cold and hot rolling, thermo-mechanical treatments)
- all kinds of advanced coating and (re-)manufacturing techniques
- special sensing techniques useful in primary & secondary raw materials sorting or processing (a.o. LIBS technology, including on liquid metal or slag)
- special characterisation techniques, like : high temperature rheometer allowing to measure the viscosity and other properties of metal and slag up to 1650°C, numerous in-use properties of metals (e.g. resistance to wear or corrosion, including at high temperature)

MORE INFORMATION

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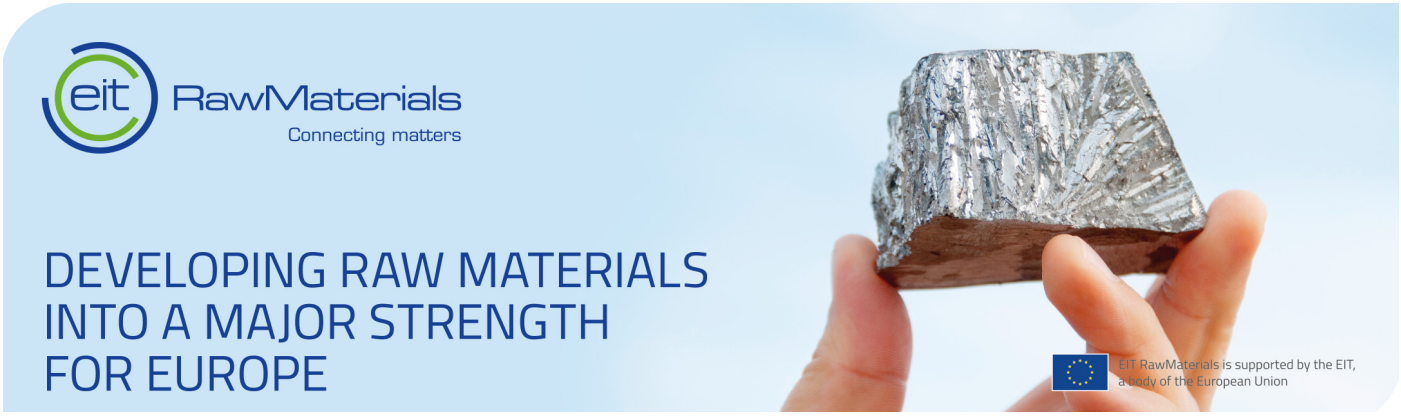
EIT RawMaterials

EIT RawMaterials Innovation Community City and Country
Berlin, Germany



ABOUT

EIT RawMaterials, initiated and funded by the EIT (European Institute of Innovation and Technology), a body of the European Union, is the largest innovation community in the raw materials sector worldwide. Its vision is to develop raw materials into a major strength for Europe. Its mission is to enable sustainable competitiveness of the European minerals, metals and materials sector along the value chain by driving innovation, education and entrepreneurship.

EIT RawMaterials unites more than 300 + partners from leading industry, RTO and universities from more than 20 EU countries. Partners of EIT RawMaterials are active across the entire raw materials value chain; from exploration, mining and mineral processing to substitution, recycling and circular economy. They collaborate on finding new, innovative solutions to secure the supplies and improve the raw materials sector in Europe.

EXPERTISE

EIT RawMaterials aims to significantly enhance innovation in the raw materials sector by sharing knowledge, facilitating matchmaking activities, developing innovative technologies and supporting business creation.

EIT RawMaterials generates a significant impact on European competitiveness and employment by driving and fostering innovation and empowering students, entrepreneurs and education partners driving towards the circular economy. This results in the introduction of innovative and sustainable products, processes and services, as well as talented people that deliver increased economic, environmental and social sustainability to the European society.

FACILITIES & SERVICES

EIT RawMaterials is supporting innovation and driving entrepreneurship along the value chain of the raw material industry through matchmaking tools and events, such as the RM Summit, the flagship event where experts gather to discuss innovation and new technologies in the raw materials value chain.

Business creation and Acceleration activities are aimed at transforming innovative ideas and projects into new business for existing companies (large and small) as well as through the creation of start-ups and spin-offs.

The RawMaterials Academy provides numerous educational activities. These range from innovative education projects launched via calls and run by the Innovation Community's partners to a number of centrally operated projects. Activities across the entire ecosystem of learners – PhD students, Masters' students, industrial partners, professionals within the raw materials sector, and wider society – foster new ways of learning and teaching by connecting academia, industry and research organisations.

MORE INFORMATION

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Elkem
Elkem Technology, R&D Technical Centre
Kristiansand, Norway

ABOUT

Elkem Technology R&D Technical Centre's 50 dedicated staff have a core competence in metallurgical high temperature processes and interdisciplinary expertise.

We offer customers and collaborating partners more than 10 000 m^2 of advanced pilot testing facilities, laboratories and workshops. The R&D Technical Centre comprises 3 sections: Pilot Services, Technical Services and Lab Services.

EXPERTISE

The Pilot Services section has its core competence in metallurgical high temperature processes. Even though most of what we do involves smelting, some assignments just involve research on material properties or process technology.

The Technical Services section employs designers, mechanics, machine workers, electricians and instrument engineers. Our designers and constructors work in close conjunction with our workshops and are able to design and build equipment tailor-made to suit experimental work for pilot testing.

The Lab Services section is made up of 3 groups: Material Characterisation, Chemical Lab and Lab Projects, and has a core competence in analysis of raw materials, environmental analysis, trace elements in silicon and quartz and materials characterisation.

FACILITIES & SERVICES

Pilot Services

- Arc furnaces and induction furnaces from 16 kW to 1 MW
- Raw material handling equipment such as crushers, screeners, pelletiser and briquette machine, separator, and drying cabinets
- We design and build new equipment in collaboration with the customer if requested

Projects and assignments generally include:

- Process development and verification
- Waste to resources
- Raw materials testing and qualification
- Equipment testing and verification
- Hydro-metallurgical treatment and processes
- Product testing
- Material processing

Technical Services

- Design group: 3D modelling in Solidworks and Risk evaluation and CE-conformity
- Mechanical workshop: the machine park includes lathes, milling machines, multiple welders, plasma burner, plate shears, folding machine etc.
- Machine shop: highly skilled machine workers create complex constructions in graphite using lathes and milling machines
- Instrumentation and electrical workshop: core competence includes high temperature measurements, using traditional and experimental techniques
- Provision of instruments, equipment and knowhow to collect essential data during run-time, and a comprehensive data-set for post-processing

Lab Services

Our lab offers a wide range of analytical techniques, laboratory instrumentation and testing methods, providing the critical analysis information clients need for troubleshooting, research and quality control. We also collaborate with our pilot services to provide analysis during experimental test runs.

Lab Projects

- Methology development: consulting in sampling, handling and preparation of samples
- Chemical lab: analysis of raw materials, alloys, slag and gases according to ISO standardised methods
- Materials characterisation: core competence includes aluminium, cast irons, silicon, steels, ferro-alloys, raw materials (coal, coke), plus ceramics and microsilica
- Equipment: «state-of-the-art» Field Emission Gun Electron Microscope (FEG-SEM), several optical microscopes and sample preparation tools

MORE INFORMATION

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ENCO
ENCO Engineering & Consulting srl
Naples • Brussels • Rio de Janeiro

ABOUT

ENCO srl is an innovation and research-consulting firm based in Naples, active since 1987. Originally specialised in business consulting and industrial engineering, it has expanded its range of activities encompassing also support on EU projects. It is currently reputed as an experienced advisor for both private business and public authorities. As an internationally-active consulting company, with two new offices in Rio de Janeiro and Brussels, ENCO srl can rely on an active network of clients and partners.

EXPERTISE

ENCO srl offers support on several national and EU-funded R&I projects. In particular, the company is specialised, inter alia, in the following fields:

- Business Consulting & Coaching: development and validation of the business idea; business support, focusing on the European market
- Negotiation: grant preparation and Consortium Agreement
- Project Management: project management and coordination of project activities; project progress and Work Plan monitoring; risk and financial management; deliverable preparation and submission; technical and financial reporting; innovation management
- Communication – Dissemination – Exploitation: design and implementation of dissemination activities; IPR strategy and management; exploitation and business planning
- Proposal Writing: partnership and consortium building; work plan and budget allocation; maximisation of project impacts; submission to funding authorities.

SERVICES

As a leading business consultant with extensive experience in business planning and development, Enco is a member of several business associations and international networks such as Confindustria Napoli and the Italian - Brazilian Chamber of Commerce. Furthermore, ENCO is member of SPIRE and EUBIA.

In addition, as Coordinator of the SMART GROUND project, ENCO will create a connection with SMART GROUND network and community.

MORE INFORMATION

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ERAMET

ERAMET Research
Trappes, France

ABOUT

ERAMET group is a world leader in alloying metals, particularly manganese and nickel, and in high-quality metallurgy. The Group employs about 14 000 people in 20 countries.

ERAMET has major research and development projects in new business lines with high growth potential, such as titanium dioxide, zircon, lithium, niobium and the rare earths, as well as recycling. These multi-metal and multi-alloy skills, also covering the whole value chain, contribute to a unique positioning for the ERAMET R&D centre based in Trappes, named ERAMET RESEARCH.

EXPERTISE

One of the strengths of ERAMET Research R&D lies in the close integration of its areas of expertise, which cover the entire metallurgical value chain, an organisation serving performance and innovation.

- Skills over the entire value chain, from mines to finished products, through the use of expertise in ore beneficiation, hydrometallurgy, pyrometallurgy and conversion metallurgy
- Effective industrial application in our expertise in R&D
- Industrial experience in the mines and/or the plants for all the experts that manage our research teams
- Partnerships with the world's best schools and universities as well as with other world-class research centers
- Laboratory and pilot facilities that are regularly updated and renewed in order to assure the use of the latest technology by all departments
- A shared site with ERAMET's engineering teams

FACILITIES & SERVICES

The facilities and equipment of ERAMET Research include:

Ore beneficiation

- Comminution: crushing, attrition, grinding
- Particle size classification: scrubbing, screening, sieving, cycloning
- Concentration: density separation, flotation, magnetic separation
- Solid/liquid separation: flocculation, settling, filtration
- Process characterisation: sample preparation, mass balance, process simulations and optimisation (5 laboratories, 2 piloting halls)

Hydrometallurgy

- Chemistry of inorganic solutions: leaching, solvent extraction and ion exchange resin, precipitation, cementation, crystallisation
- Solid-liquid separation: flocculation, thickening, centrifuging, filtration
- Electrochemistry: electro-winning, electro-refining, membrane technology,
- Environment: gaseous emissions treatment, wastewater treatment, solid residue neutralisation
- 4 laboratories and 2 piloting halls: continuous pilot facilities with 50 l/h flow rate including 50 types of reactors, pumps, thickeners, belt filters and press filters, mixer-settlers, instrumentation and control systems, electrolysis and electrodialysis cells.

Pyrometallurgy

- Electric furnaces: charge preparation, pelletising, sintering, process simulation, process control
- Refining: MOR, Bessemer, Pierce-Smith, AOD
- Pilot facilities: test stands for electric furnaces ranging from 0.7 to 1.3 MW, rotary kilns between 220 kW and 1 MW, and an induction furnace 150 kW
- 1 fully equipped laboratory
- CHEMICAL ANALYSIS
- Atomic absorption spectrometry
- ICP AES – Atomic emission spectrometry
- ICP MS – Mass spectrometry
- XRF – X-ray fluorescence spectrometry

Mineral characterisation

- X-ray diffraction (XRD)
- Scanning electron microscopy (SEM, SE, BSE)
- Energy dispersive spectroscopy analyses (EDS)
- Energy Back Scattered Diffraction (EBSD)
- Qemscan (Automated statistical analysis)
- Electron Microprobe Analyses (EMPA)
- Environmental SEM
- Laser Particle Sizing

MORE INFORMATION

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GTK
Geologian tutkimuskeskus
Espoo, Finland

ABOUT

Established in 1886, GTK is an internationally oriented geoscience research agency operating under the Finnish Ministry of Employment and the Economy. GTK's core activities include economic geology, exploration, geophysics, information technology and evaluation and processing of natural resources, with a strong research effort in the analysis of geological processes and mineral systems, as well as in the development of exploration and beneficiation technologies. GTK runs the only mineral processing pilot plant in Europe.

GTK's vision is to evolve into a European centre of excellence for natural resources and their sustainable use, and to consolidate its role as the national geo information centre.

GTK currently employs 550 permanent staff with an operational budget of €50 M. The mining sector forms the most important customer group to which GTK provides confidential expertise in economic geology, exploration, mineral processing and sustainable mining both in Finland and worldwide.

EXPERTISE

GTK's expertise focuses on:

Mineral potential including studies on reserves and discovery potential of minerals, and their life cycle and total environment impact, studies in ores and ore-forming processes, and tectonic and metallogenic models.

Minerals processing including process mineralogy, development of eco-efficient mineral processing methods, environmental technologies for mineral processing. The mineral processing laboratory is equipped to develop mineral processing methods along the beneficiation chain from mineralogical analysis, testwork performance to flowsheet optimisation from bench scale to pilot scale. The materials processed include variety of ores, such as sulphide copper, lead, zinc and nickel, gold and PGM, iron and phosphate ores etc. and also mine tailings and metallurgical slags.

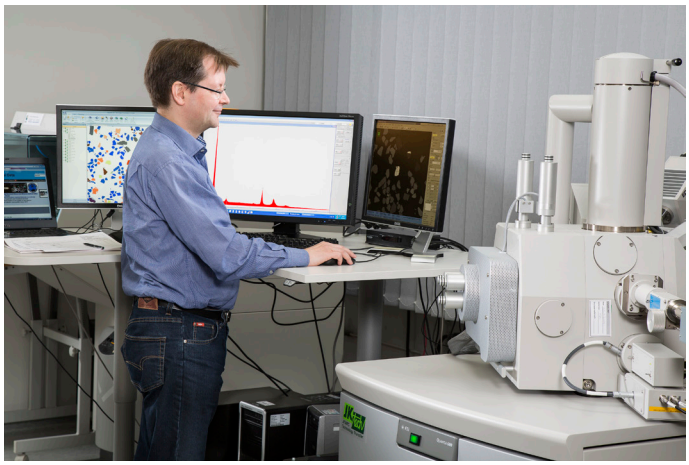
Mining environmental research including methods to minimise emissions from mine sites, risk assessment and modeling at mine sites.

FACILITIES & SERVICES

GTK Research Laboratory is part of Finland's national research infrastructure. The lab is well equipped with the latest instrumentation for the analysis and study of geological materials, such as SEM, EPMA, MLA, XRD and EDS analysis, and provides services in electron optics and microanalysis, radiogenic isotopes, stable isotopes, mineralogical studies, gem materials and gold nuggets, and selective fragmentation of geological samples and composite materials, etc.

GTK Mintec provides lab scale beneficiation testwork and pilot plant operations services. The facilities contain from lab scale to pilot scale equipments in comminution and classification, flotation, hydrometallurgy, low and high intensity magnetic separation, gravity separation and DMS, and dewatering.

Equipped with a high standard process automatic control system the pilot plant has various mineral processing operations such as metal and autogenous grinding, gravity and DMS, continuous WLIMS and WHIMS, and flotation with various size cells from 50 litres to 1.5 m^3. It also enables the testing of continuous beneficiation processes at the capacity range of 0.5 to 5 tons per hour and sample amount from 10 to 300 tons.



MORE INFORMATION

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ICCRAM

Universidad de Burgos-International Research Center in Critical Raw Materials for Advanced Industrial Technologies
Burgos, Spain

ABOUT

Universidad de Burgos-ICCRAM (UBU-ICCRAM) is a privileged Research and Innovation core, integrating an Excellence International Center in Critical Raw Materials and competence Center devoted to Advanced Industrial Technologies.

ICCRAM takes parts in the knowledge and Innovation Community from the EIT (KIC-Raw) as well as in several Action Groups within the European Innovation Partnership in raw materials such as MIREU, ENCRAM, InTrain4RM, RESET and SUBST_EXTREM, and is the Coordinator of the recently awarded RAW-NANOVALUE.

ICCRAM also leads the CRMs, Industrial and Resource Efficiency Strategy in Castilla y León (Spain), where it is a key agent in the RIS3 plan of this region. UBU-ICCRAM is a founder member of industrial clusters such as CYLSOLAR (Castilla y León renewable energy and energy solutions Cluster) and CBECYL (Castilla y León capital goods and industrial automation Cluster), maintaining a strong alliance with large scale industrial associations like SERCOBE (National Association of manufactures of capital goods) and international organisations as EU-NANOFUTURES.

EXPERTISE

UBU-ICCRAM offers a unique combination of valuable complementary capabilities:

- Applied Nanotechnology
- Materials by design-New materials technology-New alloy discovery-CRM substitution
- Circular economy approach, LCA, sustainability and ecodesign; Ecocompatibility and Nanobiotechnology
- Experts in Materials Science, Circular Economy and Law (Policy for land planning)
- Value chain design, substitution, critical raw materials and raw materials flow. Expert for the commission in the value chain design and roadmap of advanced materials and nanotechnology for EU
- Carrying out Circular Economy assessment and fate of CRMs with Municipality of Burgos and Government of Castilla y León
- Coordinators of CRM RIS3 strategy in Castilla y León. Experts and authors of RIS3 strategy
- Coordinating City Council platform on Circular Economy
- Expert in prediction of political risk
- Prediction of society reactions
- Establish industrial channels for mapping industrial demand of CRMs in EU (already carrying out this activity in three H2020 projects CRMs related)

UBU-ICCRAM, as a political-strategic partner, coordinates the cooperation between Regional Government (Burgos City Council, Castilla y León Government), Development Agencies (ADE Castilla y León) and European Associations (EURADA, ERRIN) to perform pilot demonstration projects (Industrial Prototypes, Energy Efficiency, Smart Cities, Circular economy) and to foster the replicability of different technologies to be mirrored across EU regions.

FACILITIES & SERVICES

- Supercomputing facility
- Materials mechanical characterisation laboratory: small-punch tests, servo-hydraulic general purpose testing machines (100kN and 250kN) suitable for static or fatigue testing
- X-Ray TAC (computed X-Ray tomography) and environmental chambers for the study of materials degradation
- Nanosynthesis, materials processing and production lab.
- Complete laboratory on Advanced Materials and Condensed Matter Physics (X-ray diffractometers, NMR, XRD, AFM/STM, TEM,SEM, AFM-RAMAN etc)
- Last generation complete laboratory on environmental compatibility analysis, nanotoxicity and nanosafety
- Laboratory of Toxicity, Food safety, biochemistry, agriculture in a singular facility

MORE INFORMATION

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ICSM
Institut de Chimie Séparative de Marcoule
Marcoule, France

ABOUT

The ICSM, Institut de Chimie Séparative de Marcoule, is a mixed research unit (UMR 5257) supported by the University of Montpellier, Ecole Nationale Supérieure de Chimie de Montpellier, the CNRS and the CEA.

Created in March 2007 and operating in a dedicated building since mid-2009, the ICSM is in charge of research linked to new aspects and needs of renewal of processes implying complex fluids and heterogeneous multiscale solids needed to carry out several missions on energy issues:

- Developing fundamental research in chemistry and in physical chemistry, necessary for the rise of carbon-free energies in a world context of natural resources become more rare
- Developing research into a sustainable nuclear industry and alternative energies where major advances in separation chemistry and material science are required
- Developing new paradigms for resource saving by enhancing the value chain of recycled reusable materials

EXPERTISE

To achieve these research objectives, the ICSM has implemented a strategy by developing five research lines.

1. **Understanding separation**
   The main topic is to understand and to model in a predictive way the mechanisms that take place at several scales (atomic, molecular and supra-molecular) in an ion or a metal separation process. A specific focus will be made on complex fluids and the interactions between the system components during a separation by a liquid-liquid, a solid-liquid or a precipitation by metal-assembling approach.

2. **Optimising separation**
   This axis calls for the development and the formulation of organised molecular and material systems for their efficient implementation in the framework of their recycling using dedicated technologies.

3. **Anticipated material life cycle**
   Research focuses on innovative processes to prepare materials, check the relation between their structures, composition, microstructure and their physical and chemical properties particularly in order to adapt their use and recycling.

4. **Integrate green principles**
   This focal area addresses the use of sonochemistry, alternative extraction approaches and advanced materials development in order to reduce the ecological impact of separation, recycling or energy uses processes.

5. **Development of observation and characterisation tools**
   This part deals with the development of experimental and theoretical methodologies needed to establish separation chemistry and material properties evolution theories.

The ICSM brings together multidisciplinary high level scientific skills:

Synthesis
- Molecular: Organic, organometallic, coordination chemistry
- Supramolecular: Self-assemblies, metal-assemblies
- Materials: Coordination polymers, MOF, oxides, carbides…

Physics and physical chemistry
- Aggregation characterisation
- Interfaces (liquid-liquid, solid-liquid)
- Irradiation

Separation techniques
- Liquid-liquid and solid-liquid
- Precipitation
- Membrane filtration
- Flotation

Methodology development
- Mesoscopic modelling
- Electronic microscopy
- Non-linear optics
- Scattering/Diffraction

The ICSM is already involved in several separation and materials projects in collaboration with national and international academic organisations (Regensburg University, Potsdam, Berlin, Barcelona, ITU Karlsruhe,…) or industrial partners (TND-TerraNova, VEOLIA/SARPI, CTI, Renault, Arcelor Mittal…). It is also involved in the French national LABEX project named CHEMISYST and a European Research Council grant REE-CYCLE (Rare Earth).

MORE INFORMATION

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IDENER

Optimización orientada a la sostenibilidad S.L.
Sevilla, Spain

ABOUT

IDENER is a research SME that investigates in the multidisciplinary field of Computational Science and its application to the optimization of systems and processes in key areas: Industrial Technologies; ICTs; Biotechnology; Energy; and Resource and Raw Materials Efficiency.

This approach results in a high added value that sharpens the competitive edge of complex systems by providing improvements in performance and cost effectiveness. To that end, IDENER integrates concepts from four interrelated and complementary areas: Mathematical Modelling and Simulation; Multidisciplinary Design Optimization; Control Engineering; and Software Engineering. Within Industrial Process Applications area, main contributions are: Multidisciplinary Design Optimization (MDO), process modelling and simulation, tools for effective decision making and public engagement through the integration of knowledge and decision support frameworks (algorithms) and fostering of resource efficiency through digital systems.

EXPERTISE

IDENER services along the Raw Material Value Chain are:

- **Design of experiments:** The company has a fully equipped laboratory for metal extraction and electrodeposition tests: spectrophotometer, potentiostat-galvanostat, reaction carousel, etc. The experiments are planned under a Design of Experiments approach in order to holistically analyse the interactions of all main variables considered at a time with the aim of saving costs, resources and time, and to increase the precision of results.
- **Multidisciplinary Design Optimisation (MDO) based engineering:** MDO is a field of engineering that focuses on the use of numerical optimization for the systems and equipment design that involve a number of disciplines or subsystems (e.g., thermodynamics, mechanics, fluid dynamics, etc.), and using MDO allows to study the performance of the discipline's interactions. By solving the MDO problem early in the design process and taking advantage of advanced computational analysis tools, the design cycle can be improved, and the time and costs reduced. It also allows a concurrent design of control strategies, and an aligned engineering with the operational aspects.
- **Digital twins:** The multidisciplinary team of the company holds an extensive background in modelling and simulation. This way, there are extensive capabilities to produce digital representations of the systems of interest aimed at the design and testing phases prior to the physical production. Digital twins have a large potential not only to improve design, operation and maintenance but also to predict environmental impacts. Detect production bottlenecks and scale-up processes.
- **Other contributions to the area:** Knowledge improvement on the availability of raw materials, alternatives for CRMs, tools for effective decision making, public engagement, and communication and dissemination activities.

FACILITIES & SERVICES

Apart from laboratory equipment, the company holds the license of several software useful for the activities described above as for example Design Expert, Matlab or Simulink.

MORE INFORMATION

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IMN - Łukasiewicz
Institute of Non-Ferrous Metals - Łukasiewicz Research Network
Gliwice, Poland

ABOUT

The Łukasiewicz Research Network – Institute of Non-Ferrous Metals (Łukasiewicz-IMN) in Gliwice is the main research and development center of the Polish non-ferrous metals industry.

The Institute's complex activities comprise: research, development, consulting and implementation works. They also cover industrial and laboratory tests, modern engineering solutions and technical services in the field of treatment of non-ferrous metals ores and other mineral materials, pyrometallurgical and hydrometallurgical processes of metals recovery from ores, concentrates and secondary raw materials, recovery of the associated metals, wastes recovery and utilization, environment protection, new alloys and composites, processing of metals and alloys, and analytical chemistry.

The facilities, equipment and extensive contacts with industry provide Łukasiewicz-IMN with the potential to perform research works not only at laboratory scale, but also at pilot and even at industrial scale.

EXPERTISE

The Institute activities include all stages of metallic materials production: from ore treatment to technologies for production of modern products meeting all environmental standards. Łukasiewicz-IMN has conducted many research works for the metallurgical industry, developed technologies and equipment i.e. flotation machines for recovery of minerals from non-ferrous metals ores, technologies for recovery of metals i.e. Cu, Zn, Pb and by-product metals, e.g. Re, both from raw materials and from solutions and residues produced in the particular processes. Many of the Łukasiewicz-IMN technologies have been implemented into industrial practice, i.e. recovery of rhenium from acidic wastewaters produced at KGHM (Polish producer of copper).

The Institute, as a public institution, has also conducted a number of strategic development studies for the national economy. The Łukasiewicz-IMN's highly-qualified staff has great experience in managing research projects, developing works and implementing innovative technologies. The Institute specialists have participated in a number of national and international – EU projects.

FACILITIES & SERVICES

Łukasiewicz-IMN can perform research works at laboratory, pilot and industrial scale.

The Institute is equipped with laboratory and pilot infrastructure for:

- Enrichment of ores (crushing, grinding, screening, flotation, gravity and heavy media separation) – e.g. mills, crushers, hydrocyclones, separators, concentrating tables,
- Hydrometallurgical Laboratory and Pilot Installations for leaching – e.g. autoclave, leaching/filtration, Reactors, filtration – filtration press, SX, IX, mixer-settler type installation, electrowinning/electrorefining, Installation of various electrolytic cells, evaporation – various evaporators
- Pyrometallurgical equipment – e.g. electric arc-resistance furnace, induction furnace, electric furnace for low temperature pyrolysis with various capacities, electric furnace for examinations of softening and melting points, Waelz kiln, gas and oil furnaces, ISA furnace, briquetting machines, installation for high-temperature studies of viscosity, agitators, separators, shredders, moisture analyzers, granulators, screeners
- Equipment for studies related to environmental protection – e.g. desulphurisation, electrodialysis, nanofiltration installations, dust meters, gas analyzers, micromanometers

The important element of Łukasiewicz-IMN's infrastructure is the accredited Analytical Chemistry Centre, which provides complex classical and instrumental analytical services and develop complete analytical solutions, including suitable certified reference materials production for current and new technologies.

MORE INFORMATION

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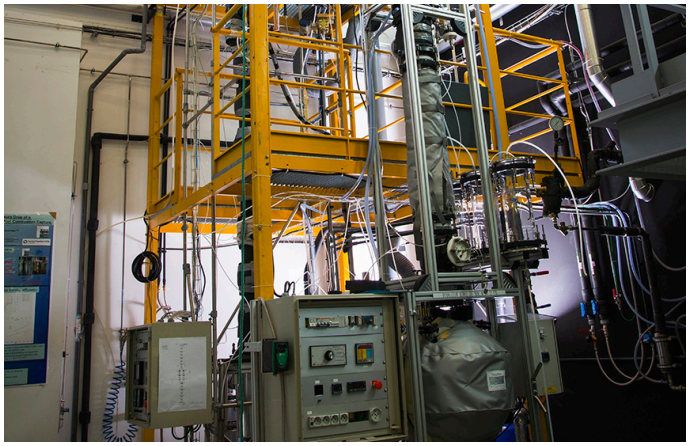
INP Toulouse / LGC

Institut National Polytechnique de Toulouse /
Laboratoire de Génie Chimique
Toulouse, France



ABOUT

INP Toulouse is a top ranked French university that provides high-level undergraduate and postgraduate education across a wide range of engineering disciplines. Its research and tertiary education programs spread over 7 campuses, of which 6 are located in Toulouse itself, in the South-West part of France. It is home to 7000 engineering students, of which a quarter is international. Research at INP Toulouse is carried out by no less than 19 research laboratories.

Within PROMETIA, INP Toulouse is represented primarily by the Laboratoire de Génie Chimique, whose expertise and facilities are reported in the following paragraphs. LGC is a leading French research laboratory in Chemical and Process Engineering, with over 160 permanent scientists and engineers, and 150 PhD students and post-doctoral fellows. It is a joint research laboratory between the French National Centre for Scientific Research (CNRS) and two universities, the Institut National Polytechnique de Toulouse (INP Toulouse) and the Université Paul Sabatier (UPS).

EXPERTISE

LGC pursues industry-driven research across all scales necessary for development of state-of-the-art and innovative industrial processes, from the smallest molecular or particulate scale right through to industrial scale systems. The organisational structure comprises six research departments, which provide the LGC with the ability to address the widest spectrum of activities in the field of chemical and process engineering.

Closest to the core activities of the PROMETIA network and the metallurgical field, the LGC has renowned scientific expertise and ongoing research activities in:

- Liquid-liquid extraction, with major contributions to the development of processes currently used to process nuclear fuel through extraction columns design
- Multiphase reaction engineering for development of complex advanced extraction processes
- Molten salt processes, for uranium extraction, industrial and rare metals separation and extraction processes
- Process intensification for efficient and innovative continuous process design
- Physical and physico-chemical beneficiation processes for mineral ores and wastes (size reduction, classification, gravity separation, dewatering, …), texture and liberation analysis, sampling system design and analysis
- Solid-liquid separation, with design of advanced membrane separation technology
- Thermodynamic modelling of multiphase geochemical systems

FACILITIES & SERVICES

Research and development programs carried out at the LGC rely upon a strong capacity for experimentation, analysis and modelling. Experimental facilities most relevant to the PROMETIA network activities include:

- A 250 m^2 process analysis platform with the latest analytical equipment, dedicated to characterisation of solids, liquids and gases.
- Technical laboratories dedicated to lab-scale research on physical and chemical separation and extraction processes relevant to research and development in extractive metallurgy, hydrometallurgy and pyrometallurgy, including a biotechnology development facility.
- Technical platforms designed for large pilot-scale testing, supported by a mechanical workshop and engineering design team. Examples of pilot scale equipment relevant to the hydrometallurgical field include distillation columns and fluidised bed reactors several meters in height, and full scale classifiers and gravity separators.
- The latest simulation and modelling tools and software for process modelling and simulation.

MORE INFORMATION

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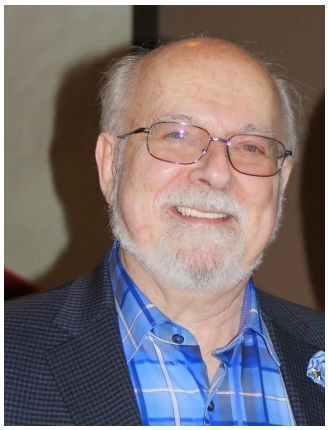
JL LLC
Jack Lifton, LLC
Farmington Hills, Michigan, USA

ABOUT



Beginning in 1962 Jack Lifton was a research scientist; a plant manager; a technical operations/sales manager; and a CEO in the OEM automotive; electronics; and minor metals production industries for more than 40 years.

He began specialising in the sourcing of technology metals and materials for those industries
25 years ago and today after 53 years of experience focuses on evaluating the business operations of ventures dependen on the secure and regular sourcing of technology metals and materials.

EXPERTISE

- Evaluation of the business operations of mining, refining, fabricating and marketing of technology metals and materials
- Recommendations of refining technologies

SERVICES

Jack Lifton, LLC provides due diligence studies of technology metals and materials based businesses for institutional investors, and advises businesses in operation or in development on how best to meet the criteria of institutional investors in their industrial sector.

Jack Lifton currently has and has had mining, refining, and fabrication clients on every continent, and he is a frequent visitor to their mining, refining, and fabrication sites around the world.

MORE INFORMATION
Website: www.jackliftonllc.com
Contact: Jack Lifton
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SCARON
Scaron Consulting GCV
Herentals, Belgium

ABOUT

After retirement as chief scientist at Umicore, I founded and am now Managing Director of my own company, with the purpose of helping companies, universities and research centres in their research and innovation processes in the broad field of advanced materials, non- ferrous metallurgy, recycling and sustainable energy.

EXPERTISE

Scaron consulting GCV offers advice and help in the field of R&D strategy, management and auditing. The scope of activities encompasses strategies and roadmaps, portfolio analysis, product and process development, product characterisation and evaluation, Capex and Opex evaluations, business model development, bankable feasibilities studies and IP landscaping.

SERVICES

Scaron Consulting GCV is a one person consulting company working on contract base in the above mentioned fields.

Thanks to a broad industrial and academic network, I can also recommend and introduce research partners for collaborative projects.

MORE INFORMATION
Contact: Jean Scoyer
Jean.Scoyer@gmail.com

JKU Linz

Johannes Kepler University Linz (JKU)
Linz, Austria

ABOUT

Johannes Kepler University Linz (JKU) sees itself as a university with strong regional roots and an international orientation. It pursues unconditional quality standards in research and teaching and aims to move consistently towards the top of the European league.

The researchers at JKU - around 160 professors and 2,600 academic staff - are constantly gaining new insights, which they relate to established knowledge and further deepen in a constant dialogue with society, the economy and culture. JKU focuses on the regional and global challenges of our time, both in teaching and research, as well as directly within the framework of its third mission (science with and for society).

Today, JKU is a broadly positioned university with core competencies in the fields of technology (engineering, computer science, natural sciences), social and economic sciences, education, law and medicine. With its values, visionary attitude and both inter- and transdisciplinary orientation, it is predestined to take on the scientific challenges of our time, especially with regard to digitalization, sustainability, diversity and inclusion.

The redesigned campus offers a modern infrastructure, living, working, recreational and living space for employees and students of the university as well as for residents.

EXPERTISE

The Institute of Process Engineering at JKU Linz has established a broad expertise considering the following points:

Design of extraction equipment
- Selection of equipment
- Optimization of geometry
- 3D Computational Fluid Dynamics analyses for columns, mixer-settlers
- Troubleshooting

Study of local phenomena
- Breakage and coalescence
- Droplet size
- Accumulation and dead zones
- Mass transfer

Regeneration of metals from black materials
- Kinetics determination
- Miniplant and pilot plant tests
- Separation of Mn and Co

Membrane filtration and distillation
- Equilibrium and pilot plant studies
- Wetting and fouling studies
- Crystallization

Chemisorption/Absorption
- Local phenomena
- Coalescence influence

FACILITIES & SERVICES

The Institute has dedicated research labs as well as a pilot plant hall to conduct experiments. The equipment mainly fulfils industrial standards and are equipped with fully control structure. For metallurgical recycling, we have the following equipment:

- Pulsed columns: DN25-DN50
- Agitated columns: Kühni DN32 and DN 60 column, QVF extraction column
- Microreactor (with and without membrane)
- Membrane test station
- Rectification column
- Stirred tanks
- Absorption columns of different diameters
- Pilot plant cake filtration
- Pilot plant membrane setup
- Membrane distillation
- Fume hoods for pilot plant equipment

From analytical side, we have basic equipment to characterize the liquids (density, viscosity, ..), but as well as analytical facilities such as ICP, TOC, and access to a LIBS.

The Institute has a broad experience in modelling extraction processes via Computational Fluid Dynamics and 1D approaches to enable an appropriate design of the extraction equipment (columns, settlers) but also to enable a predictive online monitoring of the process.

MORE INFORMATION

Website: https://www.jku.at/institut-fuer-verfahrenstechnik/
Contact: Mark Hlawitschka
mark.hlawitschka@jku.at

KU LEUVEN
Katholieke Universiteit Leuven
Leuven, Belgium

ABOUT

SIM² KU Leuven is a world-leading, interdisciplinary research cluster at KU Leuven in the field of urban and landfill mining. SIM² KU Leuven's mission is to perform cutting-edge fundamental, strategic and applied research contributing to cost-effective, zero-waste valorisation of End-of-Life waste, mining waste and industrial process residues.

EXPERTISE

SIM² KU Leuven targets zero-waste valorisation of urban and industrial waste. Key focus areas are:

1. Direct (pre-consumer) recycling of metal scrap and swarf generated during the production of metal based (intermediate) products
2. Post-consumer recycling and/or urban mining of, respectively, flows and stocks of complex, multi-material, metal-containing products (as for instance a hybrid electric vehicle)
3. Landfill mining of historic urban solid waste
4. Metal recovery from flows of industrial process residues from primary and secondary metal production
5. Metal recovery from stocks of landfilled mining waste and industrial process residues.

The zero-waste vision implies that for (4) and (5) the residual mineral matrixes are valorised in building or engineered materials.

As the coordinator of 6 (Marie-Curie) European Training Networks (FP7, H2020) and as a leading partner in both EIT Raw Materials and the European Enhanced Landfill Mining Consortium (EURELCO: www.eurelco.org), SIM² KU Leuven has key assets to participate in EU projects. These flagship domains are:

- Solvo- and ionometallurgy (for critical metal recycling (cf. http://www.kuleuven.rare3.eu/ and Advanced ERC Grant SOLCRIMET)
- Pyro/plasma-, electro- and hydrometallurgy
- Development of innovative building materials from secondary resources
- Enhanced Landfill Mining (cf. http://elfm.eu/ and www.eurelco.org)
- Sustainability assessment of recycling processes (cf. LCA, MFA etc.)

FACILITIES & SERVICES

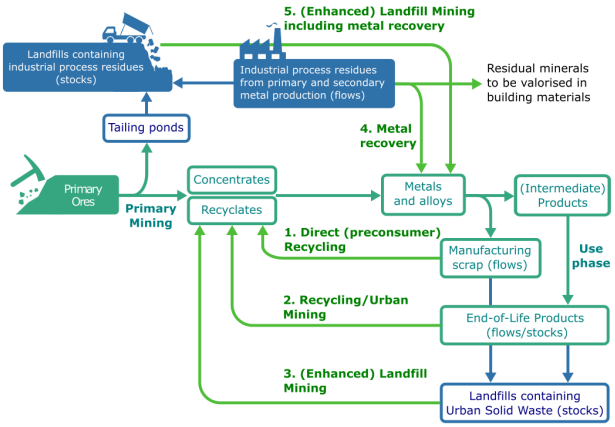
SIM² KU Leuven has extremely well-equipped laboratories for performing work in pyro-, hydro-, electro-, solvo- and ionometallurgy:

- A wide variety of furnaces for pyro- and electrometallurgical experiments
- Various equipments for synthesis/characterisation of molecular organic and inorganic compounds
- Lab-scale and mini pilot-scale equipment for solvent extraction;
- Various analytical techniques, e.g. FEG-EPMA-WDS, ICP-MS, CS-AAS, XRF
- Equipment for process intensification (Autoclave (Büchi Ecoclave) equipped with ultrasound probe; Multiple ultrasound devices, Malvern Mastersizer LDA)

Likewise, state-of-the-art possibilities are present for the development of engineered materials out of cleaned residues:

- A fully equipped lab for the synthesis and characterisation of building materials (e.g. Vicat, isothermal conduction calorimetry, a range of rheometry set, Mössbauer spectroscopy, Nanotom Phoenix (submicron resolution), Nikon X, Skyscan 1172 micro CT (micron resolution), mercury intrusion porosimetry etc.)

A detailed list can be found here: http://kuleuven.sim2.be/about-sim%c2%b2-ku-leuven/research-equipment/



MORE INFORMATION

Website: http://kuleuven.sim2.be
Contact: Dr. Ir. Peter Tom Jones
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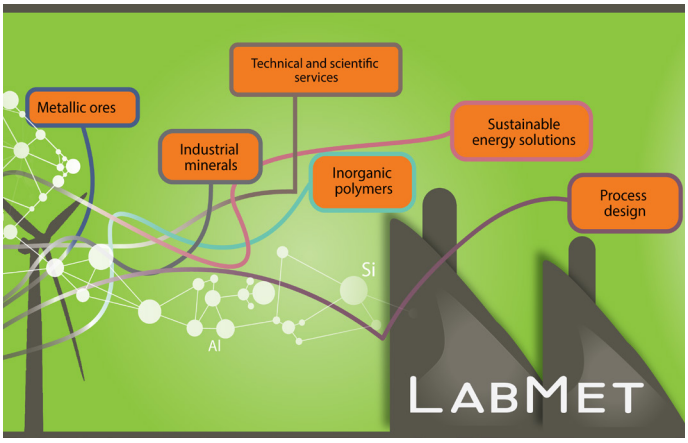
LabMet NTUA

Laboratory of Metallurgy, National Technical University of Athens
Athens, Greece



ABOUT

The National Technical University of Athens (NTUA) is the oldest and most prestigious technical educational institution in Greece. Based on Euro Research Ranking Data, NTUA reached 10th place in 2010 for educational organisations and 3rd position in Networking Rank (Reputation).

The Laboratory of Metallurgy (LabMet), School Mining Engineering and Metallurgical Engineering, one of the most active NTUA laboratories has gained significant expertise in the fields of extractive industries, including processing of ores and industrial minerals, environmental protection, rehabilitation of sites polluted from mining and metallurgical industries, valorisation of metallurgical wastes and development of high-added value products, development of energy efficient processes, modelling and computer simulation of industrial production processes, life cycle analysis and environmental assessment of products and industrial processes.

EXPERTISE

In the last 10 years LabMet has been involved in more than 30 European and 20 national research projects, with a turnover of more than €10 M in funding, and disseminating more than 300 scientific publications in international journals and scientific conferences.

LabMet also provides technical and scientific consulting services to various Greek and EU companies, including Aluminium of Greece, LARCO S.A, SCHLAGMAN BAUSTOFFWERKE GmbH & Co KG., EMED SLOVAKIA, Thracean Minerals S.A., S&B Industrial Minerals S.A. and Hellas Gold S.A.

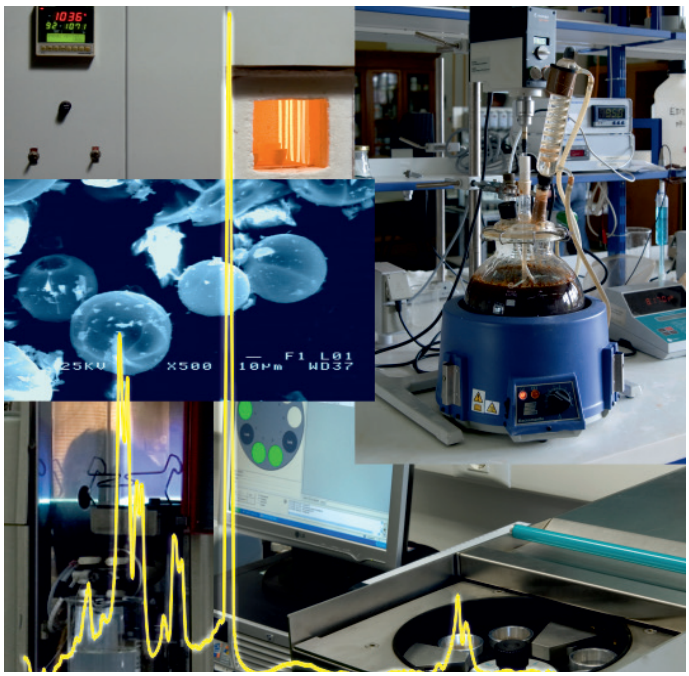
Networking in the areas of mining, ornamental stones and mineral processing is another important activity. The laboratory was actively involved in the establishment of networks at European level like EUROTHEN (European Thematic Network on Extractive Industries), OSNET (Ornamental and Dimensions Stones Network) and NESMI (Network focused on Sustainable Mining and Processing Industries).

LabMet is an associated partner in the Knowledge and Innovation Community (KIC) called EIT Raw Materials, while its team leaders are members of the European Construction Technology Platform (ECTP), the ERECON Steering Committee, the EIP on Raw Materials Operational Groups and the Ad-Hoc working group of SHERPA Group on the Raw Materials Score Board.

FACILITIES & SERVICES

The laboratory is equipped with modern equipment for physicochemical characterisation like, ICP-MS, XRF, XRD, SEM, TEM, TG/DTA/DSC, laser particle analyser and thermal conductivity testing of insulation materials (meets the industry standards ASTM C518, ISO 8301, JIS A 1412, DIN EN 12939, DIN EN 13163 and DIN EN 1266), NIR reflectance.

The laboratory's infrastructure includes equipment for raw materials preparation, like crushing, grinding, separation, and for "finishing" processes and semi-industrial scale pilots for pyrometallurgical and hydrometallurgical processes. Complementary tools such as engineering simulation packages (TRNSYS, SuperPro, ANSYS and FLUENT), and environmental impact assessment software for Life Cycle Assessment of a product/process (Gabi and Simapro) are available in LabMet's library, enabling modelling approaches through systems Engineering Life Cycle.



MORE INFORMATION

Website: www.labmet.ntua.gr/Default_en.aspx
Contact: Prof I. Paspaliaris
paspali@metal.ntua.gr

LGI
LGI Sustainable Innovation
Headquarters in Paris | Connections worldwide

ABOUT

At LGI we make innovation happen. We help trendsetters during each step of the creation process: we strategise, operate, accelerate, explore and finance innovation. We support ideas and projects that address social or environmental challenges, and which generate economic return for businesses.

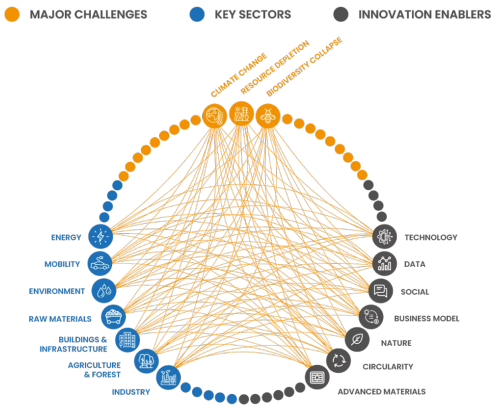
With innovation at the heart of the process, our approach is based on insights into advanced technological developments, social drivers of change, and novel business models.

Founded in Paris in 2005, the company counts a team of over 40 enthusiasts.

EXPERTISE

Three main planetary challenges driving our actions:

- *Climate Change:* Dealing with human-made global warming requires tremendous effort and imagination to counter our collective addiction to fossil fuels, and to imagine virtuous adaptation solutions to cope with the inevitable.
- *Biodiversity collapse:* The massive loss of biodiversity is a multi-factorial and extremely complex challenge. Systemic, place-based and socially beneficial innovative solutions are needed.
- *Resource depletion:* Physical laws are not optional: human activity has to abide by the Earth's finite assimilative capacity. Circular value chains and bio-based resources are among the solutions to ensure we keep within our planetary limits.



We believe in the power of innovation to transform mentalities, public policies, business models, finance and partnerships. Our work implies combining vectors of innovation, such as digital disruption, social or business model innovation. We also get involved in R&D projects that develop enabling technologies, materials and processes.

SERVICES

Innovation strategy
Co-creation is at the heart of what we do. We help you crash-test your ideas, challenge your business model, and build innovative circular and net-zero strategies.
Innovation funding & project management
We help you build and deploy a strategy to access funding for your research and innovation, and ensure you deliver on your projects.

Communication & design
We develop targeted communication strategies, craft key messages, design online and offline campaigns, and then watch them go viral.

Digital platforms
We create and launch tailored user-centric platforms to support innovation and all of your collaboration needs.

MORE INFORMATION

Website: www.lgi.earth
Contact: Bastien Duplantier
bastien.duplantier@lgi.earth

LUT
Lappeenranta-Lahti University of Technology LUT
Lappeenranta, Finland

ABOUT

LUT University (Lappeenranta-Lahti University of Technology LUT) is a pioneering science university in Finland, bringing together the fields of science and business since 1969.

The international community is composed of approximately 6,000 students and experts engaged in scientific research and academic education.

Clean energy and water, circular economy and sustainable business are the key questions of humankind to which LUT seeks solutions through technology and business.

Business cooperation
LUT has a tradition of strong links with the business community. The Finnish business journal «Talouselämä» has ranked LUT as the best university in business technology cooperation in Finland. We promote business generated by scientific research. This is demonstrated by the university's own investment company Green Campus Innovations, which supports LUT's research-based start-up companies.

International affairs
LUT University aims to be a forerunner in education by securing international quality labels for their degree programmes as a sign of excellence in the teaching.

EXPERTISE

Clean energy
- Energy markets and solar economy
- Energy conversion and storage technologies
- Sustainability science

Circular economy
- Water purification and reuse
- Processing of secondary and renewable raw materials
- Products and life cycle assessment

Sustainable business and entrepreneurship
- Innovation and sustainable value creation
- SMEs and international entrepreneurship
- Business analytics and decision-making
- Digitalisation of businesses

Cross-cutting themes
- Digitalisation and data science
- Focus area research in the Russian context and with the best Russian partners

SERVICES

Research services
The research at the Lappeenranta University of Technology is carried out in close cooperation with the industry.

The university is part of an innovation chain in which new knowledge and the latest research results can be utilized by business.

The university's research services offer a point of contact for researchers. Companies can also make use of the university's laboratory and measurement services and have students complete their master's theses for them.

Educational services
LUT University's Centre for Training and Development provides diverse training and development services for companies. Combining technology and economics are at the core of the university's own expertise and research.

LUT Language Centre offers expert language services, such as language training and language certificate services, customized for the needs of their private and company clients.

Technical services
LUT provides various expert services for its cooperation partners and external clients. The goal is to produce professional services that are close to the clients.

MORE INFORMATION

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MPIUK
Materials Processing Institute
Middlesbrough, United Kingdom

ABOUT

The Materials Processing Institute is a not-for-profit research and innovation centre, globally recognised for the development and commercialisation of technology. Research is focussed on developing new advanced materials and processes, achieving a zero carbon and hydrogen future, deploying new digital technologies and reducing waste through a circular economy.

The Institute supports clients to develop and commercialise innovations through integrated research programmes and collaborations. This support ranges from early-stage scientific development, through to the design, construction and operation of large-scale demonstration assets developed utilising laboratory desktop research through to large scale pilot facilities. Advanced technology management tools are used to support client technology portfolios and the Institute has been delivering complex multi-partner research and innovation programmes for over 75 years.

EXPERTISE

The Materials Processing Institute has a long and successful track record in research and innovation. The Institute supports innovation through the development and commercialisation of technology; this is delivered by scientists, engineers, and project teams with expertise in materials science, using state-of-the-art equipment, laboratories, workshops, demonstration, simulation, scale-up, pilot and production facilities.

Expertise extends to:

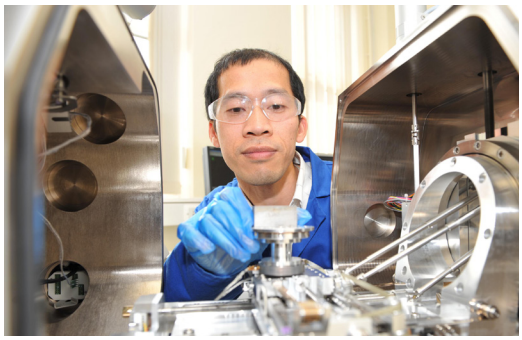
- Experimental and Computer Modelling
- Thermodynamics
- Instrumentation and Control
- Materials Microscopy
- High Temperature Materials
- Chemical Analysis
- Materials Testing

FACILITIES & EQUIPMENT

Materials and process research is focussed on steel, metals, ceramics, glass and natural materials. By drawing on core Institute expertise in metallurgy, thermo-fluid dynamics and engineering, new technologies are developed to increase yield and improve the quality of materials and processes.

Products and services provided aim to support materials and process enhancement.

Research Services - Private and collaborative research programmes and specialist testing
Consultancy - Technical due diligence, market studies, mergers and acquisitions support and capex support
Training - In-depth courses based on the major technologies currently in global operation
Steel Industry Services - The Institute has an extensive track record of delivering product and process innovation and creating efficiencies through improved materials, processes and quality. Iron and steel services include research, consultancy, technical support, training, pilot and up-scaling.
Specialist Melting - The Normanton Plant provides steel alloys and revert melting services. Specialist steels are available for sectors such as nuclear, defence, offshore, aerospace, automotive and engineering. The commercial production of steel alloys draws on decades of experience in developing new and unconventional steels and the steel processing expertise of the Institute.



MORE INFORMATION

Website: www.mpiuk.com
Contact: Alan Scholes
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NNH
The Norwegian Network for Hydrometallurgy
Oslo, Norway

ABOUT

NNH is a network for process industry and research institutions working in hydrometallurgy in Norway. So far, our members are the two largest universities, NTNU and UiO, the major technological research organisations, SINTEF and IFE, and the process industries, Boliden Odda, Glencore Nikkelverk, KA Rasmussen, Kronos Titan, NOAH, Solberg Industri and Yara International.

EXPERTISE

In short NNH covers most methods used in hydrometallurgy: leaching, solid – liquid separations, separation methods like solvent extraction, precipitation, crystallisation, etc.

Members are among world leading companies on production of Ni, Co, Zn, NPK-fertilizer, TiO2 and recovery of PGMs and PMs.

The research organisations have state of the art equipment and facilities. This is possible to use by everyone willing to pay the price required.

FACILITIES & EQUIPMENT

The best way for other members to learn what facilities are available is to access the web-pages of SINTEF and IFE:

www.sintef.no
www.ife.no

The universities are a little bit more difficult to get access to since they are not commercial entities, so we would recommend to contact both their contact person and NNH.

MORE INFORMATION

Website: www.hydromet.no
Contact: Dag Øistein Eriksen
d.o.eriksen@kjemi.uio.no

NOVA FCT

NOVA School of Science and Technology, NOVA University Lisbon Caparica, Portugal

ABOUT

The NOVA School of Science and Technology, Campus of Caparica, founded in 1977, is one of the most prestigious Portuguese engineering and science public schools. It is engaged in extensive research activities developed in 16 research centres involving 1600 PhD and Master students of the total enrollment of 7800.

With a total of 550 academic staff (90% holding a PhD) and 180 non-academic staff, FCT is organised in 14 departments and 14 support services. The entrepreneurial drive of the students and graduates has led to many successful spin-offs that transfer knowledge to the market and help create value and social impact.

EXPERTISE

The NOVA FCT team involved in PROMETIA has multidisciplinary expertise in environmental engineering, geology, chemistry, waste policy, pollution, assessment, monitoring, remediation and resource recovery. It develops its activities through the promotion of research projects, outreach initiatives, training programmes, collaboration with private and public organisations, dissemination of results and science-policy dialogues. Its funding is obtained from national and internationally-funded research programmes, as well as from other sources from public and private sectors. Examples of research areas are:

1. Geological mapping: analysis of aerial photos and satellite images for the zonation of outcropping geological formations of sedimentary and metasedimentary sequences or igneous masses, related with the occurrence of ore bodies.

2. Characterisation of mineral deposits:
   - Ores description: identification of minerals and alteration, metal grades, penalty element grades; geomechanical evaluation
   - Geostatistics: integration of multiple sources of data; object based modelling; conditional estimation of ore grades in complex geological environments; multi-element mapping.

3. Electrokinetic (EK) separation: to remove contaminants from soils, sediments, sludge or recovery of RM from mine tailings, as well as studying whether these tailings can be used in construction materials.

FACILITIES & SERVICES

Field work:

- TotalStation NOKIA, GPS Mobile Mapper 120, Schmidt hammers, Soil Augers, Resistivity meter (SYSCAL), Seismograph 16S12-u PASI

Sample preparation:

- Jaw crusher, ring/ball mills, Vibratory sieve shaker, Jones riffle splitter, Core drill bench top CARDI, Muffles, Magnetic separator, Microwave assisted DIGESTION and extraction (ETHOS LABSTATION MILESTONE).

Sample analysis:

- Ions chromatographs (Dionex, DX-120 & Metrohm, 761 Compact IC), XRF Niton XL3t, Scanning electron microscope with probe JEOL T330A, Atomic Absorption PerkinElmer, Petrographic microscopes, Multiparametric probe Consort C6030, Salt-spray chamber ASCOTT, Compression test machine Seidner, Thermo Scientific HAAKE Viscotester, Slake durability device PROETI, Pundit Lab+, Shear rock apparatus 45-D0548 Controls, Hand-Held Vane Tester GEONOR H60, Dynamic probe medium, Multidimensional Gas Chromatography and Mass spectrometry GCXGC¬FID (LECO/AGILENT 7890 with CHROMATOF 2012), GC/MS/MS (Bruker Scion triple quadrupole with dean's switch and CGT auto-sampler), GC/MS (Agilent 5972 MSD), GC-NPD-FID (THERMO TRACE 2000), GC-FIS (HP 5890), High-performance liquid chromatography, HPLC-DAD-FLD (AGILENT 1100, with quaternary pump, diode array and Fluorescence detectors), HPLC-DAD (THERMO/FINNIGANMAT)

Software:

- Visual modflow, Move, ArcGIS, Rockworks, Rocscience, Riskwork bench

MORE INFORMATION

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Contact: Prof. José Júlio Alferes
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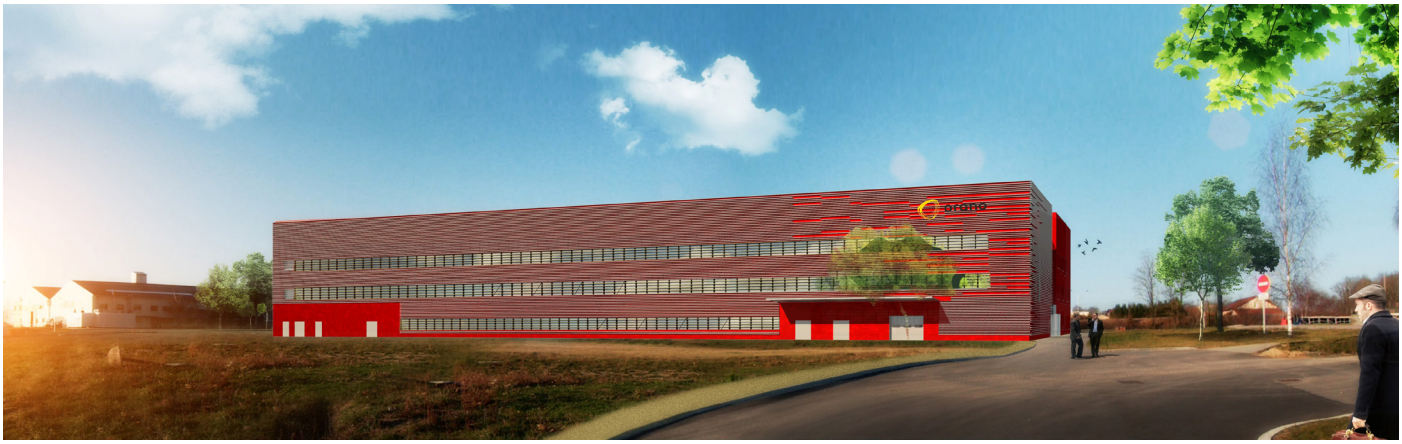
ORANO/CIME
Centre d'Innovation en Métallurgie Extractive
Bessines-sur-Gartempe, France



ABOUT

The CIME is an Orano Mining 40 years experienced, diversified, flexible Research and Development Center which develops efficient, scientific, technical and eco-friendly processes to offer its customers complete services from consultancy to laboratory tests to pilot plant tests. It was initially created to support the mining and nuclear industry (it has authorizations to store and process natural radio-isotopes bearing materials including NORM and TENORMs.

Its expertise relies in several areas such as mineral processing, hydro-metallurgy, environment, metals & materials recycling, sites and stream remediation and medical radio-isotopes.

The CIME brings together 80 professionals, split up into 5 work departments : Projects, Testing laboratory, Engineering & Workshop, Analytical Laboratory and Batteries

EXPERTISE

The CIME has recognised expertise in various sectors :

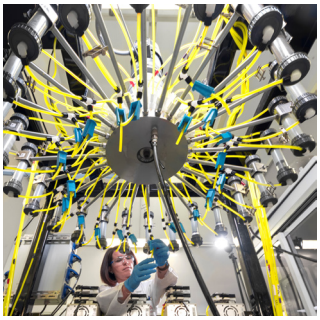
- Actinides: Process development, optimisation, automation and scale-up
- Other metals (Zr, Mo, V, As, REO recently): Process development, optimisation, automation and scale-up
- Medical research : radio-isotopes extraction, purification and production (212Pb and others)
- Environmental remediation: technologies development for water, effluents and soils
- Analytical determinations of complex media (mineral and organic chemistry) with state-of-the-art equipment and operating according to ISO standards
- Design and construction of customised and containerised pilot units
- Laboratory and pilot-scale continuous testing of a wide range of processes

FACILITIES & EQUIPMENT

The CIME is equipped with a wide range of equipment and techniques suitable for many applications.

Laboratory and pilot-scale equipment with or without data logging:

- Ore processing (comminution: crushers, mills, screens; Leaching (columns, agitated tanks and reactors, autoclaves); S/L separation (vacuum & press-filters, thickeners, centrifuges); miscellaneous (HGMS, Flotation cells, Hydrocyclones, Knelson, Shaking table), Membrane filtration (UF-NF-RO rig))
- Hydrometallurgy (Resin (IX) columns, Solvent (SX) Mixer-settlers and agitated columns, Activated carbon columns, Bio-Reactors)
- Pyrometallurgy (furnaces)
- Others: sludge cementation lab
- Characterization devices : laser size analysers, BET, viscosimeter, density meter, DTA/TGA, hand-held XRF…



Analytical laboratory :

- 4 ICP-OES, 3 ICP-MS.
- XRD, XRF.
- SEM with EDS microphobe EDS.
- Chromatography : HPLi, CPG-MS, CPG.
- 3 gamma spectrometry units and 8 alpha-spectrometers.
- Proportional counters (α, β).
- Liquid scintillation (14C, tritium…).
- Visible-UV spectrometry, IRTF.
- Carbon/sulfur analyzer.
- TOC meter, potentiometers.
- AAS flame and furnace.
- Sample preparation systems: microwaves, melters, hot plates ovens, autoclave, centrifuges
- Powders : characterization, grinding, granulation...

MORE INFORMATION

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POLITO
Politecnico di Torino
Torino, Italy

ABOUT

Politecnico di Torino (POLITO) is internationally ranked among the most important universities in Europe for engineering and architecture studies, with 37,000 students, more than 1000 teaching staff and about 800 contracts yearly with industries, government institutions and local organizations and , since it has received funds amounting to 105 million Euro for 269 projects funded in the framework of the Horizon 2020 Programme.
The Department of Environmental, Land and Infrastructure Engineering (DIATI) at POLITO is involved in more than 90 research projects carrying out research activities in the field of Raw Materials, Environmental Engineering, Excavation Engineering and Safety, Mining Plants and Underground works.

DIATI develops knowledge and expertise relating planning, authorizing, and monitoring exploitation activities throughout the mine life cycle, from exploration to post-mining closure and land rehabilitation, with emphasis on critical raw materials characterization and their reuse/recycle in a circular economy perspective and offers a specific track in «Sustainable Mining» within the recently renewed Master of Science programme in «Georesources and Geoenergy Engineering», entirely taught in English and hosting students from all over the world.

EXPERTISE

The Raw Materials, Environmental Engineering and Excavation Engineering and Safety teams carry out the following activities:

Recycling of secondary raw materials and optimization of industrial and mineral processing: secondary raw materials and energy recovery from urban and industrial waste and wastewater; physical-mechanical treatment for WEEE recycling; battery metals recovery and valorisation from primary and secondary resources; critical raw materials and metals recovery from mining tailings by means of physical, chemical, and biological processes.

Mining activities (quarries and mines): excavation techniques and technologies both open pit and underground; petrographic and physical mechanical tests at different scales; occupational safety engineering.

Environmental engineering and circular economy: Life Cycle Assessment (LCA), Life Cycle Risk Analysis (LCRA), Ecological Footprint Analysis; environmental health risk analysis of the use of recycled products; circular economy principles applied to industries and urban contexts; asbestos-containing materials treatment and analysis.

SERVICES

Raw Materials Laboratory carries out the characterization of raw and secondary materials by means the following measurement methods based both on optical microscopy and on spectroscopy IR and RAMAN: MOCF, MOLP, SEM, XRD, micro-RAMAN and micro-FTIR. Researches on mineral and secondary raw materials treatment are carried out by means dimension and shape determinations, comminution tests, magnetic, electrostatic and gravimetric separations, flotation tests.

Air Water Waste Laboratory carries out basic and applied research projects on topics such as: waste prevention and treatment for the recovery of raw materials and / or energy, wastewater treatment, water purification, groundwater and soil remediation and, finally, greenhouse gas mitigation through innovative technologies including the use of microalgae. The following instruments are available: UV and IR spectrometer, FID gas cromatograph, Mass gas chromatograph, ICP spectrometer, ionic chromatograph, HPLC, COD and BOD devices.

Geomechanics and Geotechnology Laboratory carries out tests both on-site and in the laboratory for mechanical and technological characterization of rocks; also, it operates in the numerical modeling sector, through «general purpose» calculation codes such as Flac®, Udec®, Map3D®, for analysis related to field problems and specific calculation programs developed for analysis and data processing of various types

Circular Economy laboratory carries out applied research on waste treatment (physical, mechanical, biological) and conversion into resources and energy. Laboratory equipment: ED-XRF Rigaku spectrometer, Retsch MM200 ball milling unit, centrifuge, UV-Visible spectrometer, UV-Visible portable photometer, COD digester, BOD analyzer (30 reactors), multi-parameter probe (pH, EC, ORP, T), oven, muffle, shaking incubator (T: 5-60°C), anaerobic digestion reactors (batch: 4x2L, 30X0.5L; semi-continuous/continuous: 1x3L) for fermentation processes at 20-50°C, biogas portable analyzer.

MORE INFORMATION

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REIA
The Rare Earth Industry Association (REIA)
Leuven, Belgium

ABOUT

The Rare Earth Industry Association (REIA) is an international non-profit organization representing the global REE industry. Founded in June 2019, under the auspices of EIT Raw Materials Internationalization project GloREIA. The network continues to grow today.

REIA has active members worldwide representing all major countries. With such a global context, REIA is well placed to contribute to a better understanding of rare earth element (REE) value chain.

Mission:

GATHER the key REE stakeholders, best practices and, most importantly, life cycle data to state a common vision for for developing a Circular Economy in the Rare Earth Industry

CREATE operational synergies, methods, based on best practices, reports and data from previous projects and evaluations

SHARE vision, ambitions and objectives through collaborative research efforts, data and publications

Vision:

The REE industry faces numerous obstacles such as inefficient recovery of rare earths from end users/end products, high environmental impact from production and processing and high volatility of the raw material prices. To combat these issues, REIA, concurrently gathers key supply chain actors already on the global market and share and create information which leads to an innovative REE industry of the future.

MORE INFORMATION
Website: www.global-reia.org

SIEMCALSA
Sociedad de Investigación y Explotación Minera de Castilla y León, S.A.
Boecillo, España

ABOUT

SIEMCALSA (Castilla and Len Exploration and Exploitation Society) is a mining exploration company settled in Castilla and León, Spain. The company's headquarters are located in the Boecillo Technological Park, 15 km south of Valladolid.

The company was created in 1988 by an initiative of the regional government of Castilla and León with the aim to promote the mining activity in the region. The partners are: regional CEISS Bank; Junta de Castilla y León, which is the regional government; and MAYASA, a mining company totally owned by the central Administration.

SIEMCALSA is a small company, 13 people at the moment. The technical staff are composed of 6 geologists and 1 mining engineer, all of them with more than 12 years of experience in mining exploration.

The company usually collaborates with other entities, including universities, public companies or research institutions such as the IGME, the Geological Survey of Spain. Furthermore, in the last 2 years, SIEMCALSA has joined several European teams, such as PROMETIA, in order to collaborate in projects of interest at European scale.

EXPERTISE

The company keeps, since it was created, 3 main lines or fields of activity: Mining projects, Sector studies and Technical consultant.

In the first one, Mining Projects, SIEMCALSA covers several types of work: locating of mineral deposits, defining of resources and characteristics, studying on the metallurgical treatment (in the case of metallic ores), managing of all the administrative procedures required by the mining and environmental authorities and promoting their exploitation. The company usually focuses its activity on metallic minerals, industrial minerals and dimensional stones.

Its top achievements have been the set up of the Los Santos tungsten mine and the next start up of the Barruecopardo tungsten mine, both in west Castilla and León (Spain).

Sector studies have always been focused on the mining sector of Castilla and León and some of them have been published, such as the Geologic and Mining Map, the Mining Book, the Natural Stone Book, Fresh and Thermal Waters, or the Mineral Resources of Castilla and León.

Finally, the third line of work developed by SIEMCALSA is as a technical consultant, for a long time for the Mining Authorities but also in the last few years for different companies of Castilla and León and other places. This work ranges from exploration work, technical reports, specific assistance, etc.

FACILITIES & SERVICES

SIEMCALSA has the appropiate means to develop its mining exploration works. These means, as well as a wide documental data base, are available for the PROMETIA members.

MORE INFORMATION

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SECHE ENVIRONNEMENT GROUP

Les Hêtres BP 20
53811 Changé, FRANCE

ABOUT

With more than 35 years of experience, Séché Environnement has specialised in the following core areas:

Circular economy
Their approach combines recycling and waste-to-energy practices, emphasizing precise sorting of hazardous and non-hazardous waste. This process regenerates valuable chemicals, reclaims metals, wood, ash, and soil, while promoting local energy cycles, converting waste into gas, heat, electricity, and fuel for a sustainable future.

Hazard management
The management of Potentially Infectious Medical Waste (PIMW) involves the treatment of hazardous liquid, mineral, and organic waste, often through thermal processes. This ensures safe disposal and minimizes environmental impact. Additionally, non-recoverable waste is securely stored to meet safety standards.

Environmental services
The services offered iclude depollution and rehabilitation of contaminated sites, emergency actions to safeguard the environment and manage pollution risks, along with the upkeep of facilities and wastewater networks. This encompasses the treatment of industrial water and chemical cleaning of industrial sites.

EXPERTISE

Innovating for the environment and pursuing tangible objectives
Our R&D teams draw on a vast range of expertise that spans all the Group's business lines, including thermal, physico-chemical and biological treatments, storage of non-recoverable waste, regeneration and purification of chemicals as well as recycling and recovering waste and energy.

Treating and recovering waste into the future
We develop cutting-edge, disruptive technology to treat and recover waste where volumes are predicted to rise in the future. As creators of circular economy loops, we also design processes to harness waste that can currently only be incinerated or stored and transform it into new resources.

Tackling economic and environmental challenges
The Group's R&D teams focus their efforts on improving processes to assist the business lines. This pursuit of incremental innovation helps make the Group more competitive, enhances quality and better protects the environment.

Anticipating the demands of our industrial clients
To support our technical and sales teams, we carry out many studies and assessments on the waste of our clients to optimize treatments, reduce environmental impact and bring about the environmental transition in industry.

FACILITIES & SERVICES

Séché Environnement's services encompass waste collection, management of both hazardous and non-hazardous waste, incineration and physico-chemical treatment facilities, solvent regeneration capabilities, an R&D laboratory, wastewater treatment services, and the production of RDF (Refuse-Derived Fuel).

MORE INFORMATION

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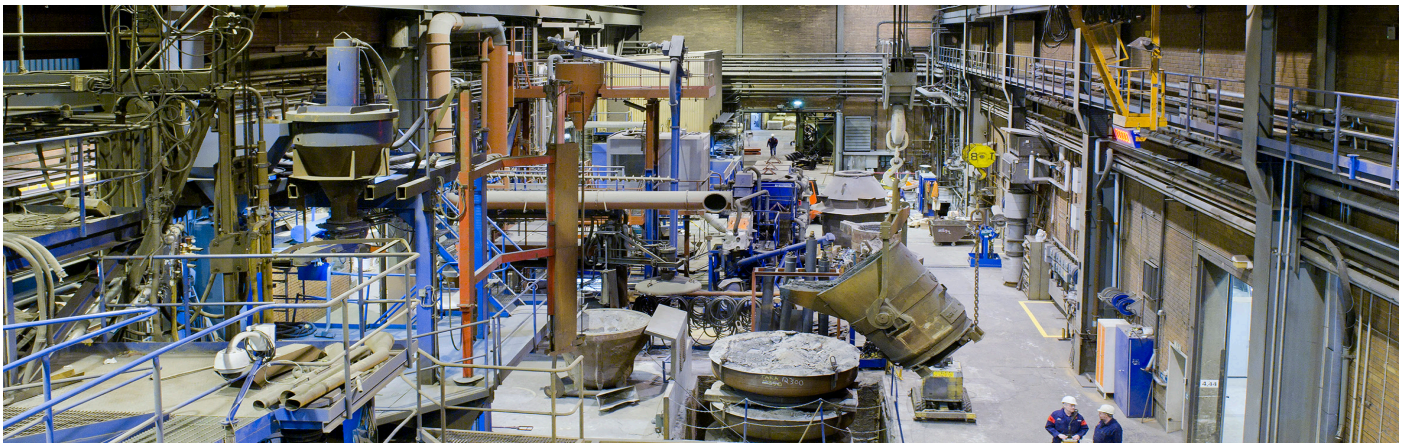
SWERIM AB
Swerim AB
Luleå, Sweden



ABOUT

Swerim AB is a Swedish independent research institute. Its business concept is applied research and technical development in process metallurgy, heating, metalworking, environmental engineering and energy efficiency mainly for the ferrous and non-ferrous industry.

Research is carried out in collaborative research projects or in projects on contract basis, financed by individual companies. Our collaborative partners and customers are found among metallurgical industries, suppliers (mines raw materials, equipment) as well as environmental (recycling, waste product management) and energy companies.

Swerim AB has approximately 100 employees and is a part of the Swerim group.

EXPERTISE

Swerim AB has expertise in design, management and operation of large pilot and demonstration installations, reduction metallurgy and ferrous alloys, as well as industrial recycling and resource efficiency. For research projects or customer projects new or existing equipment can be designed, constructed/modified and operated within a short time period. Moreover there is experience from gas cleaning, fluid bed testing and agglomeration.

In design studies and evaluation CFD and FE modelling, thermodynamic modelling as well as process integration (systems analysis) are conducted and supported by advanced process knowledge.

FACILITIES & SERVICES

Swerim AB has unique large-scale pilot plant equipment in metallurgy and metalworking. The equipment includes e.g. electric DC and AC furnaces of 5 and 10 tonne, and a 6 tonne universal converter. These can all be modified for the specific trial setup and requirements of raw materials.

During tests the gas can be cleaned in the desired way by combining different parts of the pilot gas cleaning facility as dry filters, gas adsorption scrubber, high pressure scrubber as well as dry electric precipitator in series or in parallel. Measurement systems for conventional or gas analyses of mass spectrometer can be connected.

Pre-tests can be conducted in available laboratory furnaces or in technical scale-sized ones as e.g. induction furnaces of 150 kg.

The metalworking pilot plant includes e.g. rolling mills and reheating furnaces.

MORE INFORMATION

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TRISKEM
TRISKEM INTERNATIONAL
Bruz, France

ABOUT

Founded in 2007, Triskem International SAS is an independent French company with net assets of €1.1 M and a workforce of 15 people, including 5 persons dedicated to our research and development activity.

We manufacture and commercialise highly selective resins used in the separation, purification and recuperation of specific elements. Triskem Resins are used for:

- the analysis of precious samples (environmental monitoring, radiation protection,)
- the high precision determination of isotope ratios (dating/ geochronology)
- the recuperation of high value elements (production of radio metals for medical use and recuperation of their respective target materials)
- the recovery of particular elements before effluent release

Since 2009, Triskem International has set up Research and Development projects in collaboration with universities and research centres worldwide.

In 2015 Triskem International moved into its own building, which comprises administrative offices, customer services, R&D laboratories and production facilities. This change optimised the interactions between these various departments and thus improved our ability to respond to our customers' requirements and to enhance our R&D work.

EXPERTISE

The scientific team has an excellent reputation in the international community (participation in the working groups of the French nuclear equipment standardisation agency and ISO, external IAEA expert and instructor).

Triskem International is a member of the Atlanpole Biotherapie regional incubator in Nantes, and is proud to participate in a project identified as being important for the development of French competitiveness. The company is also part of the BPIfrance Excellence community.

MORE INFORMATION

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TU Delft
Delft University of Technology
Delft, The Netherlands

Technische Universiteit Delft

ABOUT

TU Delft is the largest and oldest Dutch public technical university, and conducts high-quality teaching and research. With eight faculties, TU Delft hosts over 19 000 students at bachelor and master levels, and more than 2660 scientific staff.

TU Delft has a strong research profile with its main focus on engineering and applied sciences. TU Delft researchers developed many new technologies used today, including Glare, a Fibre Metal Laminate used in the Airbus A380 skin, and the recycling technology in the field of materials innovations. TU Delft pays extra attention to developing solutions in today's major social issues of health, energy, environment, and infrastructures & mobility. TU Delft leads and participates in a large number of EU FP projects.

EXPERTISE

TU Delft has strong expertise in metals extraction and recycling. It has multi-disciplinary and cross-faculty knowledge groups from mining, extractive metallurgy, recycling, product design for sustainability and life cycle assessments of raw materials.

The Department of Materials Science and Engineering (MSE) undertakes coherent and innovative research dedicated to development, production, characterisation, processing and recycling of materials, with a strong focus on metals. Metals Production, Refining and Recycling (MPRR), as a group of MSE, is active in education and research on primary metals production and recycling.

Resource efficiency, energy saving and reduction in global warming gases in metals production are vision of the group's research. Resource recovery and metallurgical recycling and refining for critical metals such as Rare Earth Elements (REEs) from industrial waste and EOL products – "urban mining" – are the main focus of the group's recent and future activities. Development of sustainable solutions to materials criticality and scarcity is our long-term research vision.

TU Delft is a core member of EIT Raw Materials (KIC Raw Materials) and participates in various EU FP7 funded projects on raw materials including Rare Earth Metals recycling REEcover and EREAN.

FACILITIES & SERVICES

The department MSE of TU Delft has dedicated research labs for characterisation and control of microstructure of metals, joining and characterisation of mechanical properties, extractive metallurgy in pyrometallurgy, hydrometallurgy, and electrometallurgy, with access to essential analytical facilities (XRF/XRD, SEM-EDS, EPMA, ICP, AAS, LECO).

For extractive metallurgy and metallurgical recycling, we have the following equipment to meet high quality research demands:

- advanced softening and melting equipment for high temperature packed-bed reactors (blast furnace ironmaking, 1800°C)
- high temperature drop-tube furnace for single particle behaviour (1600°C),
- molten salt electrolysis cell for metals production (1200°C)
- continuous online gas analyser
- thermal balance for characterisation of metals and minerals at elevated temperatures (TGA-DTA-DSC)
- glove box for storage and handling of sensitive materials and chemicals
- high-end potentiostats for electrochemical studies of aqueous solutions and molten salts
- electrowinning and electro-refining cells
- atmospheric and pressure leaching vessels and autoclaves
- solvent extraction cells for hydrometallurgical research

MORE INFORMATION

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ULG
Université de Liège
Liège, Belgium

ABOUT

The University of Liège, or ULiège, is a major public university of the French Community of Belgium based in Liège, Wallonia, Belgium.

As of 2020, ULiège is ranked in the 301–350 category worldwide according to Times Higher Education, 451st by QS World University Rankings, and between the 201st and 300th place by the Academic Ranking of World Universities.

More than 2,000 people, including academics, scientists and technicians, are involved in research of a wide variety of subjects from basic research to applied research.

MORE INFORMATION

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UPC
Universitat Politècnica de Catalunya · BarcelonaTech
Barcelona, Spain

ABOUT

The UPC is a public institution dedicated to research and higher education.

At our schools and facilities in Barcelona Campuses, we engage in intense research activity and provide our students with an outstanding education.

We transfer technology and knowledge to companies and society and achieve highly recognised results. We are leaders in the transfer of knowledge to local industry and we strive to be an essential element of social progress and balance in the region.

The education we deliver is based on high standards, innovation, interdisciplinarity and internationalisation.

As a leading member of international networks of excellence, the UPC has a privileged relationship with global scientific and educational organisations. As a result, the University is at an advantage when it comes to attracting international talent.

EXPERTISE

The UPC is a top-quality technical university that is responsible and committed to society and people and that is governed in a transparent, participatory and democratic manner. It is a keeper of knowledge and practice in architecture, engineering, mathematics, nautical studies, optics and physics, and has a humanistic and social base.

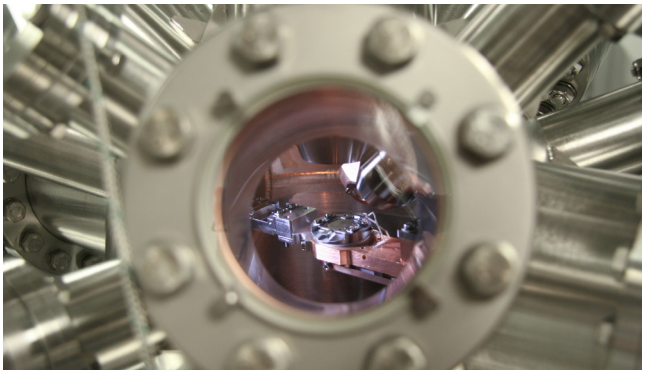
The specialisation of teachers and researchers in the Mining Department covers areas as varied as mineral processing, mining, engineering and geodetic mapping, photogrammetry, mining prospecting, mineralogy, petrology, palaeontology, applied chemistry, organic chemistry, analytical chemistry, chemical engineering and the environment. This plural specialisation allows the groups to carry out the execution of many different lines of research and collaboration agreements with companies. To carry out teaching and research, the Department has several facilities, such as laboratories, technical offices, museum, analytical instrumentation, pilot plants, and computer networks. Moreover, since its inception, the Department has encouraged collaboration with other universities, both in the country and abroad, with industry and government.

FACILITIES & SERVICES

The UPC makes available to enterprise, research groups of the university and other public and private institutions and research centres, the scientific and technical services of the UPC to support your research and innovation. Users with science and technology needs can search for the equipment and services (798) that best meet their needs.

Services:
Atomic absorption spectrometer, Coating analyser, Confocal laser microscope, Cylinder crusher, Dissolution tester, Electric furnace, FTIR spectroscopy, Flame photometer, Flotation cell, Gas chromatograph, Gas chromatograph and mass spectrometer, Grinding mill, Hardness tester, High magnification optical microscope, High-Velocity Oxy-Fuel Thermal Spray equipment for coating manufacturing, Hydraulic universal testing machine, In vitro cell behaviour testing, Induction furnace, Infrared spectrometer, Ion chromatograph, Jaw crusher, Low pressure plasma system, Microhardness tester, Microindentation hardness testers, Optical microscope, Pin-on-disk tribometer, Potentiostat, Profilometer, Petrographic microscope, Resistivity tester, Seismograph, Resonance fatigue testing machine, Salt fog chamber, Scanning electron microscope (SEM), Sieve, Stereographic aerial pictures Plotter (photogravimetry), Tabletop electron microscope, Topographic station, Ultraviolet and visible spectrometer (UV / VIS), Vibrating table, X-ray photoelectron spectroscopy, etc.

More information: https://www.upc.edu/sct/en/



MORE INFORMATION

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VTT
VTT Technical Research Centre of Finland
Espoo, Finland

ABOUT

VTT Technical Research Centre of Finland Ltd is a state owned and controlled non-profit limited liability company established by law and operating under the ownership steering of the Finnish Ministry of Employment and the Economy. VTT is a multitechnological research organisation providing high-end technology solutions and innovation services. VTT's activities are focused on three areas: Knowledge intensive products and services, Smart industry and energy systems, and Solutions for natural resources and environment.

VTT Group is the largest public applied research activity in Northern Europe with a staff of 2600 and turnover €279 M. VTT has over 70 years of experience in addressing the needs of industry and the knowledge-based society. Over the years, VTT has participated in more than 1000 European R&D Framework Programme projects, within various thematic programmes. VTT is ranked among the leading European RTOs.

EXPERTISE

VTT has experience in developing new innovative solutions for by-product metals, precipitates, slags, and wastes generated by metallurgical industry and mining operations. Our competences have focused on enabling hydrometallurgical technologies (leaching, precipitation, cementation, liquid-liquid extraction, electrochemistry, and bioprocessing) and waste treatment (characterisation, recycling, stabilisation, and landfills).

Process development is accompanied by advanced thermodynamic modelling and flowsheet simulations. The goal is to improve recovery of metals from low grade ores and industrial residues, to develop new innovative solutions for industrial residuals and to improve resource efficiency in downstream processing.

Our expertise includes:

- Hydrometallurgical process development for recovery of metals from low grade ores, tailings, industrial residues, and other complex sources
- New ways of processing and combinations of methods
- Bioprocessing of low grade ores and tailings (metals and P)
- Recovery of critical and scarce metals, such as REE and Au, by nonconventional methods
- Waste and regulations, waste stability and stabilization
- Secondary materials design and processing for reuse and upcycling
- Material technology, powder technology, substitution and value chains
- Water recycling in hydrometallurgical processes
- Measurement and control in mineral processing
- Utilisation, treatment, safe management, characterisation of mine waste, mine closure
- Advanced thermodynamics and materials modeling

FACILITIES & SERVICES

VTT has well equipped laboratory facilities with up-to-date pilot and lab scale resources.

VTT's new hydrometallurgical laboratory test facilities include leaching reactors, pilot reactors, precipitation reactors, SX pilots (12 stage mixer settler and counterflow column pilot), bio-hydrometallurgy reactors, adsorption columns and reaction calorimeters.

Flexmet hydrometallurgical pilot reactor series (each 5 or 10 L) made of titanium and equipped with scalable OKTOP mixer design and all the necessary instrumentation (T, Red-Ox, gas flow, liquid flow, agitation for gas-liquid-solid dispersion) is modular, modifiable and transportable. ICP, XRD, GC, LC and SEM are available for analytics as well as thermochemical analysis (TGA, DSC and RC).

Microbiology laboratories are equipped for biohydrometallurgical work. Additionally, materials can be further processed in in-house laboratories through powder metallurgical routes. VTT has licenses for the use of HSC-Sim process simulation software, and inhouse modelling tools Chemsheet and Chemsage are available for advanced thermodynamic calculations.

MORE INFORMATION

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WEFalck
WEFalck Scientific Advisory Services
Saint-Cloud, France

ABOUT

W. Eberhard Falck has been trading as an independent consultant from 1995 to 1999 and again since 2015. Clients include the European Commission, the European Environment Agency, the European Parliament, as well as national governments.
Past professional experiences include the British Geological Survey (BGS), the International Atomic Energy Agency (IAEA), the Joint Research Centre Petten (JRC-Institute for Energy), the OECD-Nuclear Energy Agency (NEA), and consultancy companies in the UK and Italy. Academic teaching experience includes the Technical Universities of Darmstadt and Berlin, the Université de Versailles St. Quentin-en-Yvelines (UVSQ, associate professor), and the École des Mines Nantes (now IMT Atlantique).

EXPERTISE

Scientific fields covered include environmental hydrogeochemistry, geochemical modelling, system analysis, material flow analyses, and the science-society-policy interface.

SERVICES

- Safety analyses supporting geological disposal of radioactive waste
- Risk analyses in waste disposal and mining
- (Uranium) mining waste management
- Mine closure, remediation, and long-term legacy management
- (Strategic) environmental impact assessments
- Social licensing to operate in the mining industry
- Strategic mineral raw materials assessment
- Mineral raw materials policy support
- Waste management policy support

MORE INFORMATION

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WMRC
Waste Management and Recycling Cluster Lublin, Poland

Coordinator: Centrum Kooperacji Recyklingu – not for profit system sp. z o.o. /The Centre for the Cooperation of the Recycling – not for profit system Ltd

Klaster Gospodarki Odpadowej i Recyklingu

ABOUT

Centrum Kooperacji Recyklingu – not for profit system sp. z o.o. serves as the Coordinator of the Waste Management and Recycling Cluster (WMRC).

The Waste Management and Recycling Cluster is formed by businesses, research and development units, business support institutions, consulting companies and foundations dedicated to environmental education.

The core of the cluster is made up of companies engaged in collection, disposal, processing, recycling and transport of all types of industrial waste. The main specialty of the majority of these companies is processing of used electrical, car manufacture and electronic equipment such as: cathode ray tubes and glass from the dismantled ones, worn cables, worn out computer and telecommunication equipment, used light sources, consumer electronics and home appliances from all over the country.

The Cluster also includes a manufacturing company from the outside of the waste sector, dealing with the design and manufacturing as well as with emptying of the refrigerant and dismantling of refrigeration equipment. In addition, a company dealing with designing and manufacturing of equipment, constructions and metal containers is a cluster partner.

The cluster also includes two prestigious research institutes conducting comprehensive scientific research concerning widely understood mineral resources management - from obtaining resources to waste management and environmental protection, including waste management and their use as alternative energy sources.

EXPERTISE

The main role of cluster is to:

- Build and develop a network of cooperative relations among current and potential cluster partners and a network of stakeholders
- Facilitate the access to the latest achievements of science, technology and the exchange of experiences for cluster partners, their agents and employees
- Create new and improve existing services and products to raise the level of competitiveness of the members. Including strengthening the «value chain»
- Waste and regulations, waste stability and stabilisation
- Secondary materials design and processing for reuse and upcycling
- Coordinate the cooperation, initiatives and projects towards development of the idea of «sustainable development» and corporate social responsibility;
- Promote cluster activities in the country and abroad through the website, trade fairs, exhibitions, conferences, trade missions and others;
- Administrate whole organisation and support cluster members

FACILITIES & SERVICES

Waste management is delivered according to the latest available technologies, using the best available equipment and process used for recycling, which can be used to deliver tests and experiments.

In addition, research and development units included in the cluster have their own laboratories and software which can be used by different sectors, for instance:

- The geothermal laboratory in Bańska Niżna which continues the scientific research, experimental and semi-technical work initiated by the aforementioned Experimental Geothermal Plant.
- The laboratory of Wave Methods (LWM) engages in research on the structure and properties of various geological mediums and their behaviour under different conditions.
- Environmental laboratory include research and laboratory studies in field of: environmental sampling, contaminant leaching (static and dynamic tests), research into water and soil pollution with inorganic compounds.
- Software like SimaPro and Gabi necessary in carrying out the LCA analysis (Life Cycle Assessment).

And many others.

MORE INFORMATION

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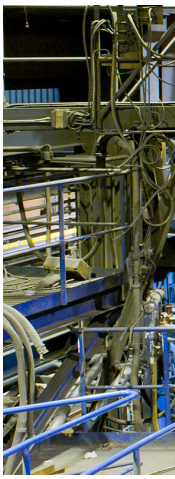
NOTES

NOTES

NOTES

PROMETIA is an international non-profit association established in Brussels, launched in 2014 at the initiative of the CEA, the French Alternative Energies and Atomic Energy Commission. It aims at strengthening European technical skills and industrial know-how in raw materials processing and at supporting industrial and economic development through collaboration.

The association brings together diverse players from industry, SMEs, research organisations and academia involved in mineral processing and extractive metallurgy for clean and affordable mining and recycling of raw materials within a single, coherent body of competence and knowledge.



PROMETIA Association
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