

CaMona – Extracting rare earths from secondary raw material in the greater Catalão region

Client II – International partnerships for sustainable innovations

The conventional extraction of rare earths is often associated with significant environmental impacts from mining. Secondary raw materials are an interesting alternative source of rare earths with potential environmental and economic benefits. The German-Brazilian project “CaMona” intends use residues from phosphate fertilizer production in the greater Catalão region to establish the industrial extraction of rare earths from secondary raw materials.

Extracting rare earths from phosphogypsum

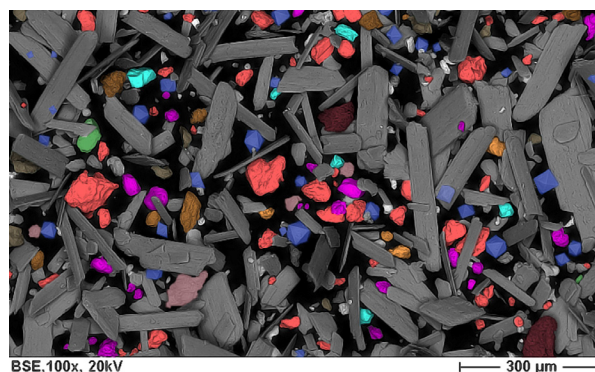
In many places, the mining processes associated with the conventional extraction of rare earths cause significant environmental damage. The extraction of rare earths from the waste products of other industries represents a more environmentally friendly alternative and also offers benefits in terms of production costs. Phosphate fertilizer production in the greater Catalão region of Brazil produces a large amount of mineral waste products, which are not yet used as secondary materials. The “CaMona” project works to develop a technical basis for the economic extraction of rare earths from these raw materials. Specifically, the joint project is dedicated to the industrial extraction of rare earths from secondary gypsum, a byproduct of phosphate fertilizer production in Catalão. To this end, the project is driving forward the development of appropriate technology with the associated process optimization right up to industrial maturity.

The “CaMona” project is designed to comprise a detailed scientific and technical development process with optimizations and innovations across all stages of material processing and through to the development of a commercially viable product.

Advanced project maturity

As part of extensive preparatory work, phosphogypsum – a byproduct of the fertilizer industry – has been identified as a possible source of raw materials with potential for commercial exploitation in the greater Catalão region because it has a valuable rare earth content. The most important carrier mineral of this gypsum is monazite, a rare earth phosphate with favourable grain sizes and adhesion properties for technical processing. This allows for processing using cost-effective physical enrichment procedures which can produce a monazite concentrate that is rich in rare earths. In the run-up to the project, first successes

were already made in producing a high-quality monazite concentrate with a low proportion of impurities as well as successfully carrying out initial chemical hydrometallurgical leaching experiments. These procedures will now be further developed and optimized in the “CaMona” project.

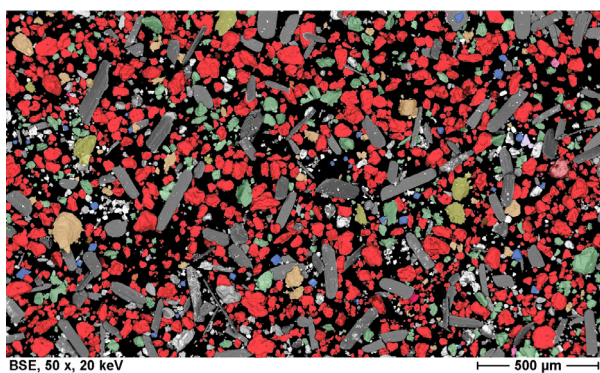


Pre-concentrate as the first step from processing and mineral enrichment. Monazite particles (marked in red here) represent the carriers of the rare earths.

“CaMona” aims to develop a procedure for processing secondary material flows that contain rare earths and to implement the project’s findings in a continuously operated pilot plant. The plant will produce a rare earth concentrate that can be further processed to turn it into a saleable product. This concentrate is broken down and leached using chemical processes to extract the rare earths. The resulting rare earth solution is then subjected to purification and further processing in downstream chemical processes. The aim is to produce a high-purity, marketable, rare earth product.

In addition to this, “CaMona” is dedicated to the geochemical and mineralogical characterization of secondary materials from phosphate fertilizer production in order to identify further potential areas for optimization. The investigations will not only focus on the secondary raw materials and

samples from monazite processing, but also on the original phosphate ore, that is, the primary material for fertilizer production.



A rare earth monazite concentrate (monazite marked in red) as a product of processing.

Sustainable production of rare earths

The knowledge generated within the context of “CaMona” will assist in the development of rare earth production by means of the proposed procedure at the Catalão site. As this type of rare earth production does not require the construction of a new mine, it therefore eliminates the corresponding costs and negative environmental factors, thus making the extraction of rare earths from secondary materials economically efficient and competitive. Furthermore, it would also help to minimize land use and energy consumption, which would likewise have a positive effect on climate protection and the reduction of environmental risks.

The Catalão location is already fully developed for industrial use due to its close proximity to the fertilizer producers. There is also a chance that synergies will arise with local industry. The industrial implementation of the project would also benefit German industry through the acquisition of further reliable long-term suppliers.

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Client II – International partnerships for sustainable innovations

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CaMona – Extracting rare earths from secondary raw material containing monazite in the greater Catalão region

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