PROJECT FACTSHEET

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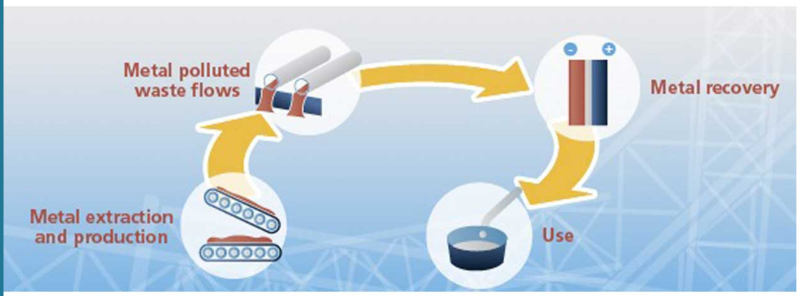
BioelectroMET

Bioelectrochemical systems for metal recovery



Luxembourg was once a region of intensive mining and steel production, and this industry is still active in the country today. LIST is a partner in a new project that is developing an innovative method to treat metallurgical waste streams in a decentralised, more environmentally-friendly manner compared to the treatment methods currently practiced.

Inspiration

Currently, metallurgical wastewater treatment uses electrowinning and cementation for direct copper recovery. Carried out at centralised treatment plants, these methods are based on immobilising residual metals and result in an accumulation of solid wastes. However, a new process under development uses microbial fuel cells to efficiently recover metals from metallurgical waste and process streams with no or limited energy input. This technology uses the organic materials and compounds already present in waste streams to produce, recover and/or remove metals. It allows even low concentrations of metals to be selectively recovered from mixed-metal streams, reducing the production of waste and consequently the need for post-treatment processing/refining.

Innovation

The BioelectroMET project, coordinated by Wetsus, Centre of Excellence for Sustainable Water Technology, and supported by the European Seventh Framework Programme, brings together 7 partners from 6 countries in Europe to develop and test a bioelectrochemical device that will efficiently recover copper and other metals from metallurgical process streams and mining wastewater streams.
The project will begin by characterising the metallurgical streams and identifying promising microorganisms and substrates for the bioanode. This information will be used to develop an optimised anode and cathode, which will then be integrated and scaled-up to a working prototype. This device will be piloted at two metallurgical plants and one mine to demonstrate on-site bioelectrochemical metal recovery.
As part of its contribution, LIST will undertake a feasibility study to determine the manufacturing and operating costs of a complete working unit, and will use Consequential Life Cycle Assessment (LCA) to provide an assessment of the potential environmental impacts of deploying the device on a wider scale.

Impact

The bioelectrochemical device that will be developed and tested in BioelectroMET has the potential to be widely adopted within mining and metallurgy as an environmentally-friendly, decentralised alternative for the treatment of metallurgical waste streams. With a high efficiency rate for metal recovery and reduced or no need for primary energy, this device has the potential to provide both environmental and economic benefits to companies in the industry, allowing them to produce, recover and remove metals from their waste streams more sustainably and at a lower cost. From a methodological perspective, LIST's involvement in the project will allow it to achieve methodological advances in the area of Consequential LCA (currently widely considered an important topic by the international LCA scientific community) thus also gaining international visibility in this scientific niche.

Partners

Magneto Special Anodes BV (NL) , Linnaeus University (SE) , Mast Carbon International LTD (UK) , University of Tampere (FI) , Universitat Jaume I (ES)

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