PROJECT PARTNERS:
Dr Sebastien Farnaud**, Coventry University & **FORTIS IBA Ltd.
BIV202401

Feasibility study for the recovery of precious metals from incinerated bottom ash (IBA) using bioleaching technology

"This project has explored the concept of alternative metal recycling routes, and we look forward to a further partnership with Coventry University in the future."
- Fern Simpson, FORTIS IBA Ltd.

This project introduced an innovative and sustainable method for recovering valuable metals, specifically copper (Cu) and zinc (Zn), from Incinerator Bottom Ash (IBA) - a waste product generated during municipal solid waste incineration. IBA often contains significant concentrations of recoverable metals, such as copper and zinc, along with other metals like iron and aluminium. Its slightly alkaline pH (around 8) makes it a challenging but suitable candidate for bioleaching processes. IBA constitutes a metal-rich waste stream, often discarded or inadequately treated, which presents an opportunity to recover valuable resources while addressing waste management challenges.

At the core of this project lies bioleaching, a technology that relies on microorganisms to dissolve metals into a leachate solution. In this project, acidophilic bacteria, which were identified through genetic analysis, were isolated from IBA samples directly sourced from Fortis facilities. In addition, a consortium of sulfur-oxidizing bacteria species (*Acidithiobacillus thiooxidans* and *Alicyclobacilli*), were provided by our Bioleaching Research Group at Coventry University, to investigate the bioleaching process. These microorganisms generated biogenic-acids that effectively break down the solid matrix of IBA, liberating the metals in a process that is both effective and environmentally friendly.

Dr Sebastien Farnaud, Coventry University

"This collaboration has demonstrated the immense potential of integrating bioleaching technologies into sustainable waste management practices. By leveraging microbial processes, we have not only developed an eco-friendly method for recovering valuable metals like copper and zinc but have also showcased the power of interdisciplinary research in addressing global environmental challenges."

The study implemented two bioleaching strategies: direct and indirect methods. Both approaches proved effective, demonstrating that bioleaching is a viable method for extracting copper and zinc from IBA. After solubilizing the metals, the next step was to recover them from the leachate. Copper was extracted through electrowinning, a technique that uses electrical currents to deposit the metal onto a cathode. Zinc recovery was achieved using a straightforward precipitation technique. This research highlights the potential of bioleaching as a sustainable solution for managing industrial waste and providing secondary sources of metals. Unlike traditional methods such as smelting, which are energy-intensive and generate harmful emissions, bioleaching relies on natural microbial processes, thereby reducing the environmental footprint while conserving resources.