Executive summary

BioElectroMET is a collaborative research project between Magneto special anodes (NL), MAST Carbon International ltd (UK), Centre de Recherche Public Henri Tudor (Lux), Universitat Jaume I (ES), Linnaeus University (SE), Tampere University of Technology (FI) and Wetsus, centre of excellence for sustainable water technology (NL).

BioElectroMET investigated, developed and demonstrated a bioelectrochemical system capable of recovering metals from metallurgical waste and process streams with no or limited energy input. In BioElectroMET the oxidation of a biodegradable electron donor at the bioanode is coupled to the reduction of dissolved metals, present in waste or process streams, at the cathode. Subsequently the electrodeposited metal can recovered in pure elemental form from the cathode, similar to electroplating. The four objectives of BioElectroMET are:

- To design a device that can efficiently recover copper (>99% of recovery) and other metals from both high (>1g/L) and low (<100mg/L) concentrated process and waste streams.
- To build a bioelectrochemical device which can selectively produce, recover, and remediate metals from mixed metal streams (>90% selectivity).
- To demonstrate bioelectrochemical metal recovery on-site at mining or metallurgical plants.
- To show that this device is economically and environmentally attractive compared to current technologies.

The BioElectroMET consortium successfully met all the milestones and considerably improved the performance of the system. Several alternative electron donors were investigated which show promise for future applications. Great advancements have been made into upscaling of the technology. Economic and environmental analysis showed that the main advantage of the technology is in its positive environmental impact.