

At a Glance

This project was a collaboration between Specialised Metals Ltd. (SML), a company involved in precious metals recovery, and Inter-Euro Technology Ltd. (IET), a company providing a specialised environmental service to electroplating and other surface treatment companies.

SML had a particular electronic scrap material – copper nickel plated pins - which contained a significant percentage of gold.

In laboratory experiments for anodic dissolution, gold was recovered as thin flakes from the gold pins.

The laboratory results with selective leaching agents for the gold pins were good with a much higher proportion of gold in the leachate compared with copper and nickel. However there were difficulties in recycling the leachate and recovering the gold.

CGPP2004/22

Closed loop system for cleaner production in recovery of metal values from electronic scrap in support of the WEEE Directive



Specialised Metals Ltd.,
Unit 17, Gorey Business Park, Gorey, Co Wexford (SML)



Inter-Euro Technology Ltd.,
Chapelstown, Carlow, Co. Carlow (IET)

Specialised Metals Ltd.

Specialised Metals Ltd. (SML) is engaged in the recovery of precious metals from surplus and waste material derived from electronics, medical device and automotive industries. Precious metals such as gold, platinum, palladium & rhodium are recovered. Specialised Metals Ltd which was founded in 2001, was set up to take advantage of Environmental Directives such as WEEE, RoHS, and ELV (motor vehicles).

Inter-Euro Technology Ltd.

Inter-Euro Technology Ltd. (IET) is an independently owned limited company established in 1989. The company provides a specialised environmental service to electroplating and other surface treatment companies on minimisation of waste, recovery of valuable materials and treatment of effluents containing metals.

Aim of this Project

SML had a particular electronic scrap material – copper nickel plated pins - which contained a significant percentage of gold.

The aim of the project was to evaluate electrochemical methods as the basis for a system to selectively leach out the desired metals and subsequently recover them as metals.



Photo 1 Gold pin raw material

Project Description

SML had developed a process in which the total metal material was dissolved in a suitable aqueous acid mixture and the gold recovered from the solution. This process produced large quantities of nickel and copper in an aqueous chloride matrix.

An alternative process recovering the same amount of gold but also recovering copper metal and nickel metal and not producing significant aqueous waste would obviously be a major advance both economically and environmentally. The most favourable methods were investigated initially by laboratory scale trials by IET for the gold plated computer contact pins, followed by pilot scale operation for another feedstock – printed circuit boards.

Laboratory investigations into anodic dissolution were carried out and achieved the objectives for the particular feed stock of gold plated computer contact pins. This involved electrochemical anodic treatment of the pins to dissolve the nickel and copper and release the gold as flakes, which could be recovered by filtration.



Photo 2 Gold flake recovered in the anodic dissolution lab trials

Another process was developed based on selective leaching of the gold using alternative leaching solutions not containing cyanide. This gave reasonable selectivity for gold compared to nickel and copper but a detailed comparison of leaching and the anodic dissolution process, showed that anodic dissolution was the preferred option taking into account environmental and economic factors.



Photo 3 Gold pins after leaching

A problem arose with the supply of metal pins so pilot trials with an alternative WEEE raw material was carried out. This alternative material was found to be unsuitable due to lack of electrical conductivity.

Achievements

In laboratory experiments for anodic dissolution, gold was recovered as thin flakes from the gold pins.

The laboratory results with selective leaching agents for the gold pins were good with a much higher proportion of gold in the leachate compared with copper and nickel. However there were difficulties in recycling the leachate and recovering the gold.



Photo 4 Pilot rig for trials with PCBs at Specialised Metals Ltd.

Observations

SML is presently evaluating the implementation of a metal recovery facility which will enable the recovery of other metals currently available in Irish waste streams. These metals are either land-filled or exported for recovery abroad.

More Information

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Cleaner Greener Production Programme

The Cleaner Greener Production Programme (CGPP) of the EPA was funded under the National Development Plan 2000 – 2006. The CGPP was launched in 2001 as a grant scheme to Irish organisations to implement cleaner greener practices while achieving significant cost savings.

Cleaner Greener Production is the application of integrated preventive environmental strategies to processes, products and services to increase overall efficiency and reduce risks to humans and the environment.

- Production processes: conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes
- Products: reducing negative impacts along the life cycle of a product, from raw materials extraction to its ultimate disposal.
- Services: incorporating environmental concerns into designing and delivering services.

The programme aims are focussed on avoiding and preventing adverse environmental impact rather than treating or cleaning up afterwards. This approach brings better economic and environmental efficiency.

Under Phase 2 of CGPP, 22 organisations were funded from a variety of sectors (e.g. chemicals, food, metals, electronics, service). The total achievements from the projects for the participating organisations included annual reductions of 250,000 tonnes in input/output streams (water/waste water), 660 MWh energy reduction and €1.6m cost savings.

The programme will continue to be funded by the EPA in the NDP 2007-2013.

This case study report is one of the reports available from the companies that participated in the second phase of the Cleaner Greener Production Programme. A summary of all the projects and CD containing all the reports are also available.

More information on the programme is available from the EPA:

Ms. Lisa Sheils or Dr Brian Donlon,
Environmental Protection Agency,
Richview, Clonskeagh Rd., Dublin 14, Ireland.
www.epa.ie/researchandeducation/research/

Programme Managers...

The Clean Technology Centre (CTC) at Cork Institute of Technology was appointed to manage the programme. Established in 1991, the CTC is now nationally and internationally regarded as a centre of excellence in cleaner production, environmental management and eco-innovation across a range of industrial sectors.

