

Corso di Dottorato di Ricerca in Scienze della Vita e dell'Ambiente, Ciclo XXXIX.

E-waste and sustainable development: innovative strategies for the recovery of secondary raw materials



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Critical RAW materials issue for EU

• Essential for the ecological transition[1];

BUT

• Production is only in few countries, most of them have not solid environmental and human policy[2]; • Recovery these materials from electronic devices (ewaste) avoiding the exploitation of mineral resources, reducing the environmental and social impact [3];

• Metal recovery from e-waste is becoming more

• EU depend on external country markets[1];

Solution

convenient than mining[4];



Recovery of metals from leach solution -UMA (Spain)-

In January 2025, I began my international period at the University of Malaga to recover metals from a simulated leaching solution using **electrodialysis** based on the selective separation of ions.



 Automatic system for pump H2SO4 inside the oxidation part; • Filling materials to improve the reaction surface;

Experimental plan				Efficient leaching rate	
Factors	Level			Со	99%
Factors	-	0	+	Li	99%
[Fe III] g/L	1	-	5		000/
Layers (n)	2	4	8		99%
Flow (mL/min)	24	-	48	Cu	89%

The green cells are the best conditions

• C- Catholyte: negative zone, reduction of ions and accumulation of positive ions (<u>Li and Co</u>);

rate				
Со	80%			
Li	85%			
Ni	56%			

Future Activities

- Another electrodialysis experiment introducing Cu into the solution;
- Implementation with biotechnology to support the development of innovative processes as a booster towards sustainability;

The results obtained from this study will support policies to boost sustainable development through virtuous management of E-waste.

References 1.European Commission, 2023; 2.Saleem H. Ali, 2014, 3, 123-134;



Finanziato dall'Unione europea







4.Xianlai Zeng, John A. Mathews and



