Tohoku Univ./ Japan Organization for Metals and Energy Security Technology

The Process of Copper Electrorefining

Copper Electrorefining Cell Suitable for Treatment of Low-Grade Copper Anodes (Black Copper)

Image of spiral forced convection

Overview

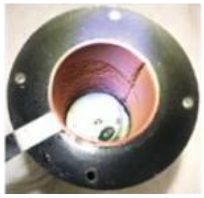
In copper smelting, the use of recycled raw materials such as e-scrap are increasing. However, since low-grade copper anodes (black copper) made from recycled raw materials are easily passivated. Therefor treatment by electrorefining has not been established. Treatment by electrowinning is now available, but it requires much more power than electrorefining.

In order to solve the above problem, basket electrolysis using shot-anodes with large specific surface area has been studied to suppress the passivation of the anode surface. But the current density of the cathode must be increased, and Cu ions must be supplied to the cathode for smooth electrodeposition.

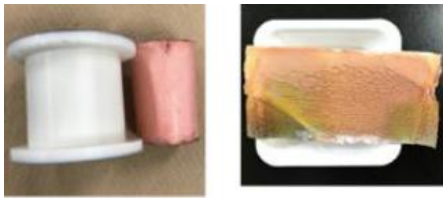
The present invention is a spiral convection cell suitable for copper electrorefining which can strongly stir an electrolyte.

Electrodeposition

◆Appearance of a cathode



Cathode before peeling



Cathode after peeling (left) on the substrate side, (right) on the electrolyte side

◆Impurity content of a cathode

Content (ppm)	Ni	Sn	Pb	Sb	Ag
Downstream	3	0	0	3	86
Midstream	3	0	0	4	145
Upstream	5	1	17	12	314
	20	-	10	5	25

Ag is not particles, but may be electrochemically dissolved and precipitated → Chemical removal is considered.

Product Application

- Increase in copper recycling
- Reduction of power consumption (unit energy consumption)

Related Works

[1] ADACHI Ken, IIZUKA Atsushi, SHIBATA Etsuro, Japan Society of Natural Resources and Materials 2024 (Akita) Web Lecture Series, Vol11 (2024) [1501-06-05]

IP Data

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