

ABSTRACT

“Urban Mining -Novel Recycling Processing for E-scrap Containing Critical Metals-”

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Developments of urban mining is one of key actions for keeping sustainability in supply of metal resources. E-scrap is also a good target for recycling of precious metals but critical metals.

Material flow analysis of metals are very essential in development of urban mining like exploration of natural ores. Rough material flows of critical metals are shown and a possibility of urban mining for critical metals is also discussed.

Pre-treatment technologies like dismantling and detachment of parts from e-scrap which are essential in the recycling are also shown. New techniques are desired for effective recycling of minor rare metals, therefore, we are trying to develop new detachment processes such as a new break down process. The principal of this new process is an electrical disintegration by electric pulse. E-scrap is broken down by high voltage electric pulses in water. IC chips and LSI can be detached from printed circuit boards under proper conditions. Ta- capacitors are also broken down to plastic parts and Ta sinter with lead wire.

Sorting techniques have been rapidly developed in recent years. Now this technique has become one of the major processes in physical separation. The key point of this process concerns what characters are analyzed by using various sensors like color, shape, weight and chemical composition. A new sorting machine has been developed using LIBS as a sensing in our project. High quality separation can be achieved by this technique especially for alloys containing critical metals.

Also in the case of metallurgical production, with its intrinsic potential of smelting, extraction, enrichment and separation methods, related technology and process flow sheets, each with their own selectivity and yield, play an important role in the critical metals recycling.