May 20, 2013

Press Release

Sumitomo Metal Mining Co., Ltd.

Development of a New Extracting Agent for Refining through Joint Research with Kyushu University

Sumitomo Metal Mining Co., Ltd. (“SMM”, Headquarters: Minato-ku, Tokyo, President and Representative Director: Nobumasa Kemori) has, through joint research carried out with the Research Group of Professor Masahiro Goto of the Department of Applied Chemistry in Graduate Faculty of Engineering, Kyushu University (Fukuoka-shi, Fukuoka Prefecture, President: Setsuo Arikawa), succeeded in developing an extracting agent with superior cobalt and rare earth extraction capabilities. It is expected to apply this extracting agent to the recovery of cobalt and rare earths in recycling processes for secondary batteries and fluorescent tubes, as well as in the processing of mineral resources.

As the nickel hydride and lithium-ion batteries that are used in products including hybrid cars and portable digital devices contain valuable metals such as cobalt, much research has been conducted into methods to recover these valuable metals from used secondary batteries. However, as well as cobalt, used secondary batteries also contain manganese, which has lead to challenges concerning efficient separation and recovery. The efficient separation of cobalt and manganese also posed challenges in the recovery of metals from nickel oxide ore and cobalt-containing seabed resources such as cobalt rich crust (*1), and manganese nodules (*2).

Furthermore, in the recycling of rare earth elements that are used in fluorescent materials, anodes in nickel hydride batteries, and magnets for motors, rare earth-containing base material is dissolved in acid to allow the recovery of these rare earth elements from an aqueous solution, but hereunto there remained challenges in terms of efficiency and separability.

Refining and recycling processes generally use a method where a specific metal is extracted, separated and enriched through solvent extraction (*3) from an aqueous solution that contains this metal, but hereunto there had not been an extracting agent that could selectively extract cobalt from an aqueous solution containing highly concentrated manganese or efficiently separate rare earth elements.

In collaboration with Kyushu University, SMM has developed such an extracting agent that boasts superior extraction capabilities for cobalt and rare earth elements.

When the developed extracting agent is mixed with an acidic solution containing cobalt and manganese, cobalt can be extracted efficiently from the solution while leaving the manganese behind. In the same way, from aqueous solutions containing both the heavy rare earth elements (*4) of thulium and ytterbium and the light rare earth elements (*4) of lanthanum and cerium (which were previously very difficult to separate), it is possible to prioritize the extraction of lanthanum and cerium.

In addition, it has also been confirmed that europium can be selectively extracted from aqueous solutions containing europium, yttrium, and zinc, and we believes that separation of these elements will become possible.

SMM shall henceforth develop refining and recycling processes that use this extracting agent.

SMM signed a Comprehensive Collaboration Agreement with Kyushu University in April 2010, and has since undertaken joint research centering on mineral dressing and extractive metallurgy. The development mentioned here is a concrete result of this research, and SMM shall henceforth continue to advance its cooperation with Kyushu University.

[Terminology]

*1: Cobalt rich crust

Cobalt rich crust is a deep-sea mineral resource that forms a crust-like cover on bedrocks on summits and slopes of undersea mountains of depth 1000m or more, and characteristically contains cobalt.

*2: Manganese nodules

These are mineral lumps with manganese and iron oxides and hydroxides as their main components. They are commonly found on deep seabed at depths mainly between 4000m and 6000m and also contain large amounts of valuable metals such as nickel, cobalt, and copper.

*3: Solvent extraction

This is a method where an extracting agent is added to and mixed with an acidic aqueous solution that contains certain metal ions to selectively extract these metal ions. By adding an aqueous solution adjusted to have a lower pH value than the original acidic aqueous solution to the extracting agent which contains the metal ions and then agitating it, the desired metal ions that are contained in the extracting agent can be recovered into the aqueous solution. Furthermore, by adjusting the ratio of the extracting agent to aqueous solution, it is also possible to enrich these metal ions.

*4: Heavy rare earths, light rare earths

Classification of rare earth elements.Scandium (Sc), yttrium (Y), and the 17 lanthanoid elements from atomic number 57 (lanthanum, La) to 71 (lutetium, Lu) are known as rare earth elements. Lanthanoid elements are sometimes divided into “light rare earth elements” (from lanthanum to europium (Eu, atomic number 63)) and “heavy rare earth elements” (from gadolinium (Gd, atomic number 64) to lutetium).

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