

YAMAGUCHI LAB.

[Extractive Metallurgy and Resource Recovery]

Integrated Research Center for Sustainable Energy and Materials

Recycling of Resources and Materials

<http://susmat.iis.u-tokyo.ac.jp/japanese/members.html#yamaguchi>

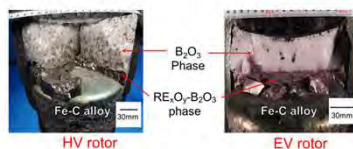
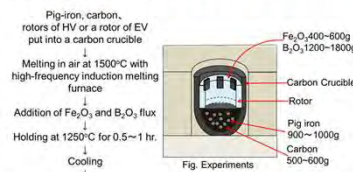
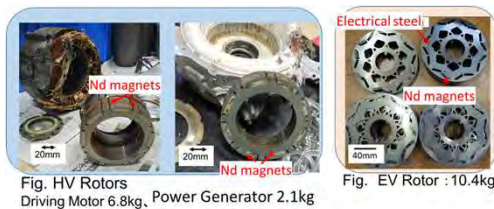
Extractive Metallurgy of Non-Ferrous Metals

Recovery Process of Rare Metals in Non-Ferrous Extractive Metallurgy

In the non-ferrous smelting process, the base metals like copper, lead, and zinc as well as rare metals are produced from secondary materials such as scrap metals, alloys, and residues. The valuable metals that result from the refining process can provide raw materials for extensive applications in numerous fields.

We have suggested a new and effective recovery process of rare metals in the non-ferrous extractive metallurgy.

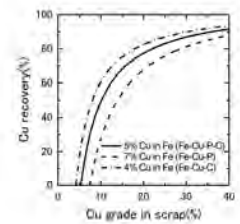
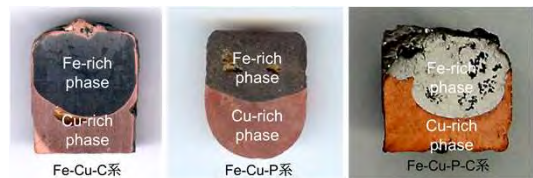
- ◆ Recovery of rare earth elements from magnet scrap by using B₂O₃ flux
- ◆ Copper enrichment based on liquid phase separations
- ◆ High-temperature calorimetry



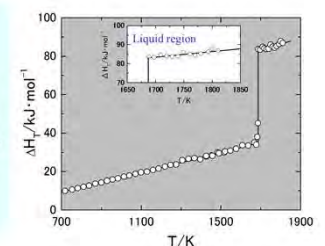
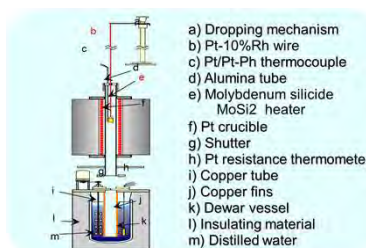
The total of the concentration of rare earth oxides were over 99 mass%.
Recovery rates are more than 99%

RE oxides	Ni ₂ O ₃	Dy ₂ O ₃	Pu ₂ O ₃	Al	B	Cu	Fe	Mn	Ni	Si
From HV rotor	60.9	26.7	12.4	<0.001	<0.001	0.04	0.03	0.01	<0.001	0.003
From EV rotor	62.9	14.1	2.9	<0.001	0.003	0.01	0.06	0.03	<0.001	0.005

Rare earth elements in the HV and EV rotors were recovered by the proposed process



Copper enrichment based on liquid phase separations



Recovery of rare earth elements from HV and EV rotors

High-temperature heat content measurement of silicon by drop calorimeter