

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>

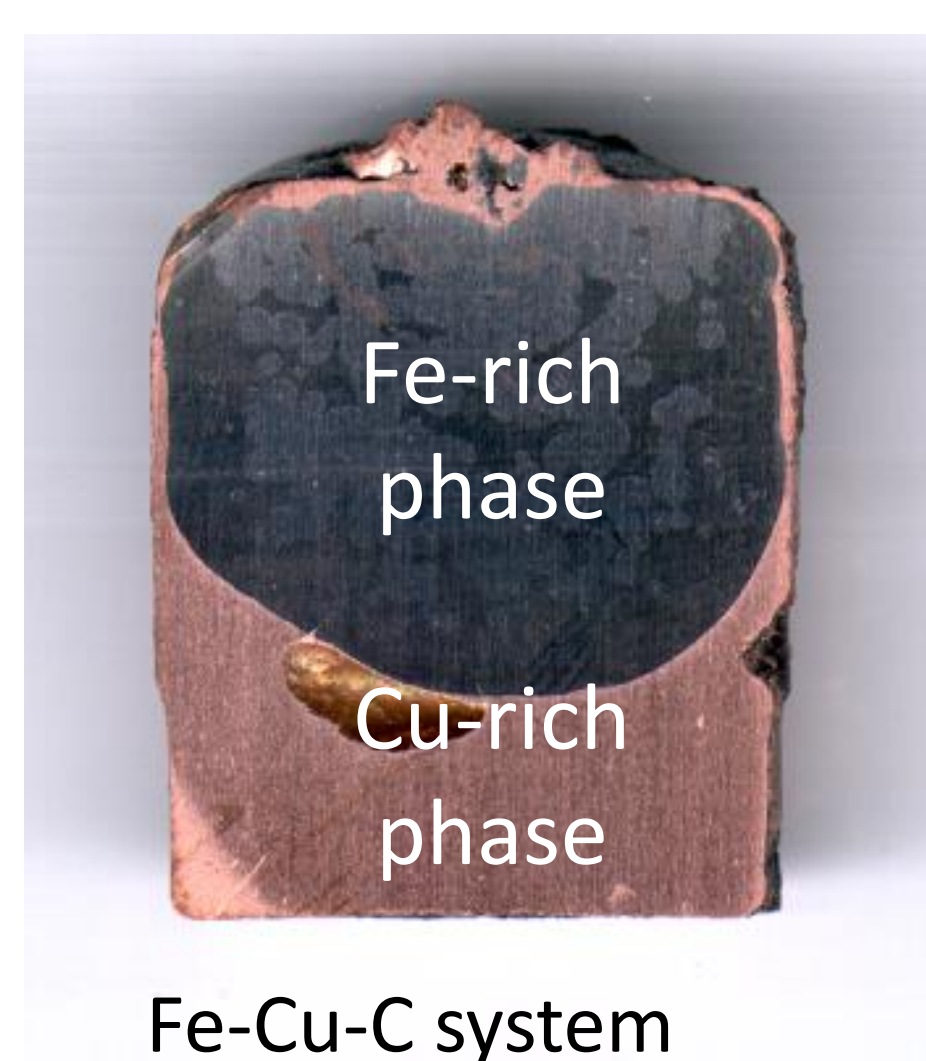
Extractive Metallurgy of Non-Ferrous Metals

Recovery Process of Rare Metals in Non-Ferrous Extractive Metallurgy

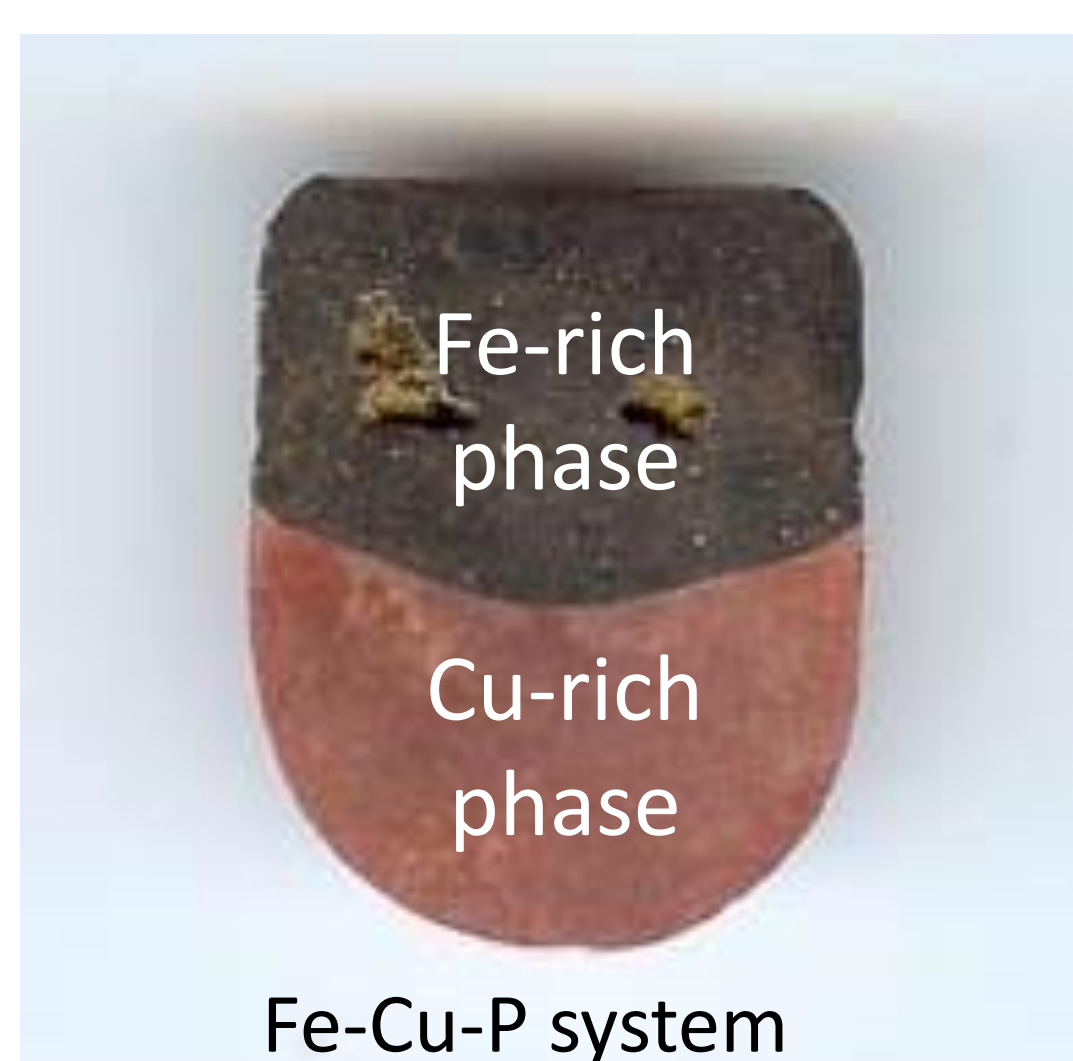
In non-ferrous smelting process the base metals of copper, lead and zinc as well as rare metals are produced from secondary materials such as scrap metals, alloys and residues. The valuable metals that result from the refining process provide the raw materials for a wide range of application possibilities in various fields.

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

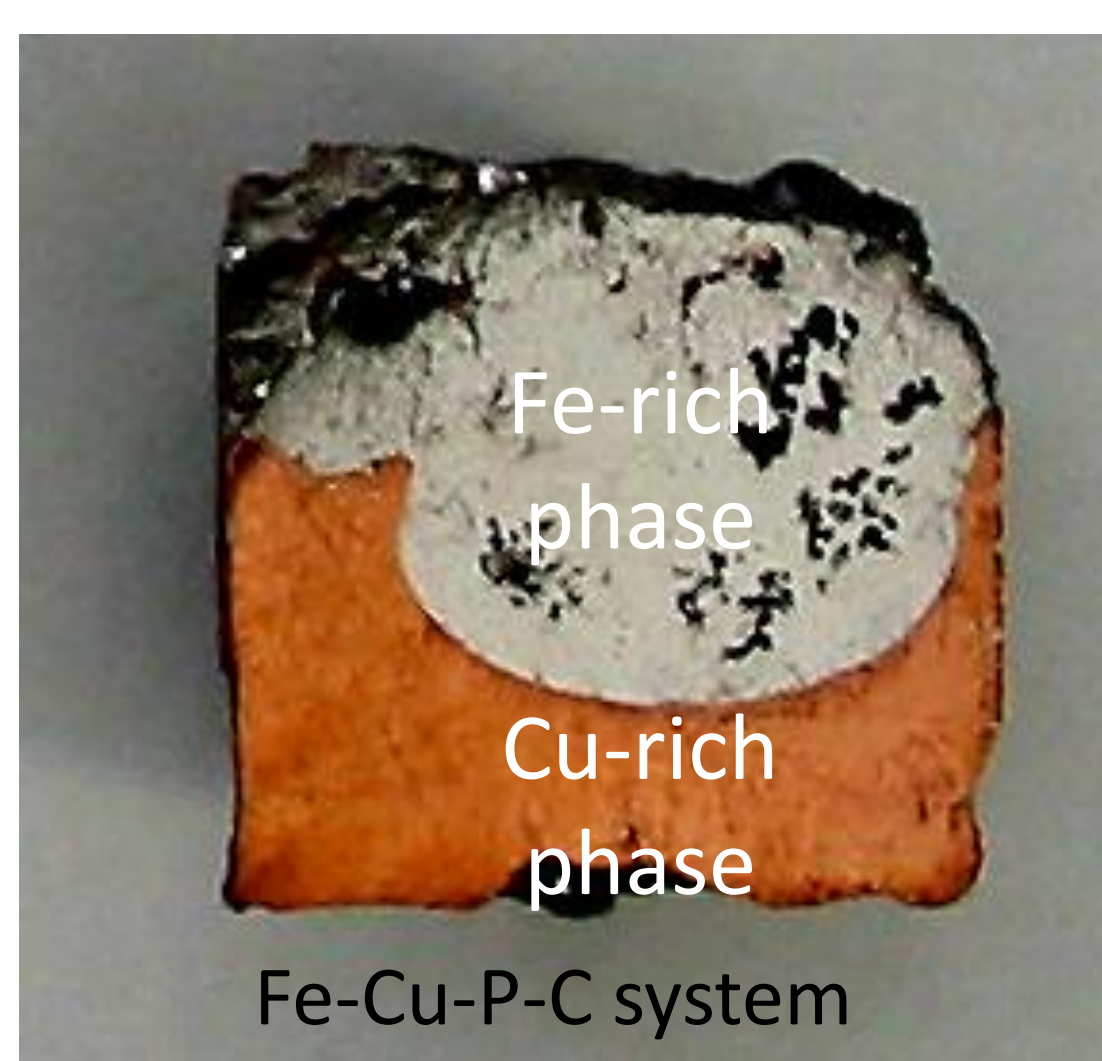
- ◆ Copper enrichment based on liquid phase separations.
- ◆ Recycling of platinum group metals for used auto catalyst.
- ◆ Recovery of rare earth elements from magnet scrap by using B₂O₃ flux.
- ◆ High temperature calorimetry.



Fe-Cu-C system



Fe-Cu-P system

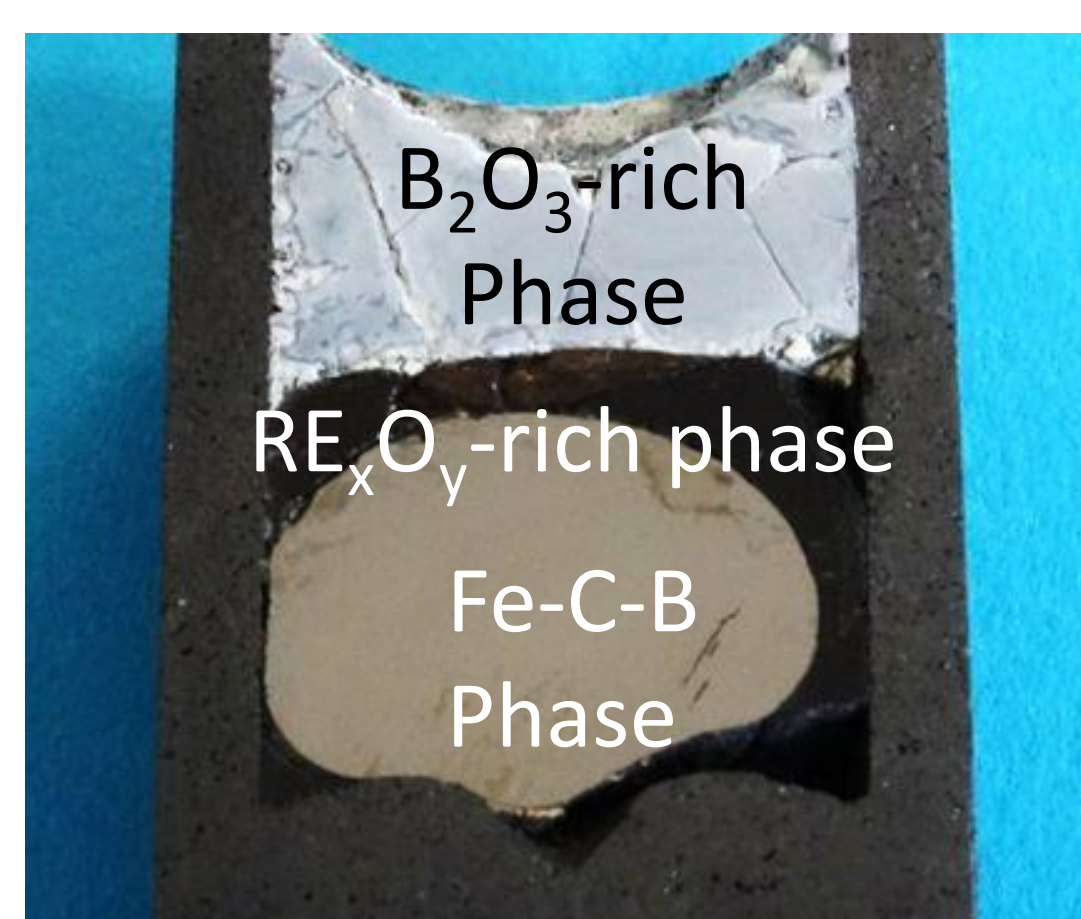


Fe-Cu-P-C system

Copper enrichment of low grade copper scraps



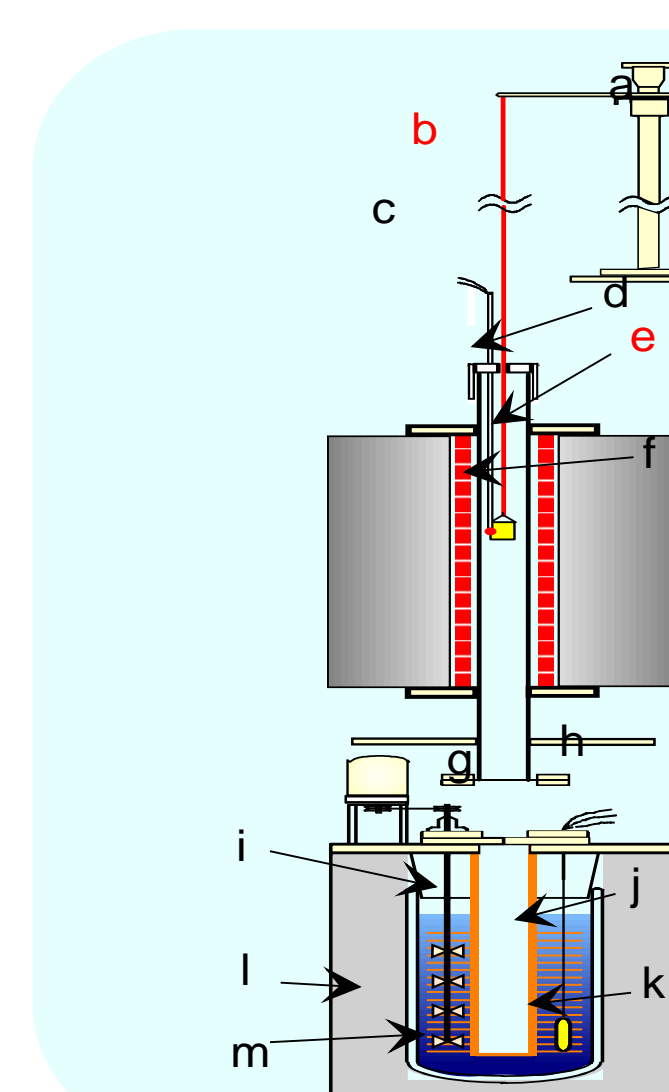
New and efficient process for recovery of platinum group metals.



3 phase separations of the RE(Nd,Dy,Pr)-Fe-B-C-O system



Recovered rare earth oxides



- a) Dropping mechanism
- b) Pt-10%Rh wire
- c) Pt/Pt-Ph thermocouple
- d) Alumina tube
- e) Molybdenum silicide MoSi₂ heater
- f) Pt crucible
- g) Shutter
- h) Pt resistance thermometer
- i) Copper tube
- j) Copper fins
- k) Dewar vessel
- l) Insulating material
- m) Distilled water

High temperature drop calorimeter