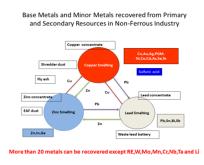
NAKAMURA LAB.

-Establishment of Sustainable Society from Coupling Technology and Social system-

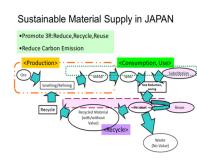
International Research Centre for Sustainable Materials **Endowed Research Unit Non-ferrous Metal Resource Recovery Engineering** Metallurgy and Recycling System for Metal Resource Circulation

Coupling Technology and social system for **Sustainable Society**

Concept of Coupling Technology and Social system







Our aim is to develop the process technologies and social systems for metal recycling, waste detoxification and energy recovery based on the non-ferrous smelting industries

- ✓ Thermal and hydro processing for metal recycling and waste treatment (Chemical Thermodynamics)
- ✓ Waste treatments and energy recovery based on the nonferrous metal smelting
- ✓ Field stock recycling of waste plastics containing. brominated flame retardants
- ✓ Development of Electrical Disintegration method using High Voltage Electric Pulse for E-crap

bromination reaction of selected metal oxides

Reserve (of Waste) to Stock

Aims of Project: Artificial Mineral Deposit

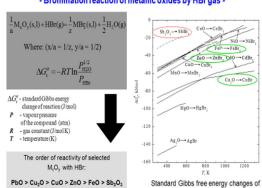
- including Minor Rare Metals Management of Harmful Metals
- contains in the WEEE
- Circulation in Asian Block
 - prevent environmental impacts

The definition of resources is "a certain amount of substance with a fixed quality." In many cases, WEEE has a fixed quality, but it is difficult to collect a certain amount.

Introducing the concept of "Accumulation", we are aiming the realization of source circulation", especially minor rare metals.

THERMODYNAMIC CONSIDERATION

- Bromination reaction of metallic oxides by HBr gas -



A process image of the bromination-evaporation process for EAF dust Scrubber NaOH solution ZnBr2 and PbBr2 600-700 °C $Zn(OH)_2$ Pb(OH)₂ Rotary kiln Iron Oxide Pellet: mixture of EAF dust, carbon and waste plastics containing Bromibated flame Retardants

Pellets of mixture of EAF dust. carbon and waste plastics containing Bromibated flame Retardants are roasted and evaporating Zn and Pb by bromination reactions. This process can be operated at low temperature (600-700)