FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Development of Environmentally Sound Recycling Technology of Rare Metals	
Name: Toru H. Okabe	**Institution**: The University of Tokyo

1. Background of research

Rare metals are an essential requirement for modern industries of high-tech, energy-saving, and green technologies. Our country has supplied high-tech, energy-saving products with excellent performance to consumers across the world. However, our country does not have any efficient mineral resources of rare metals. In many cases, most of the mineral resources of rare metals are localized to certain countries. Therefore, continual and stable securing of rare metals is crucial, from the viewpoint of the competitiveness of our industries and continual economic growth.

2. Research objectives

In this project, new environmentally sound technologies for recycling rare metals will be developed. Furthermore, the project is aimed at the advancement of material sciences through the cyclical use of rare metals. Human resources to support the field of process engineering of rare metals in the future will be trained and developed. A world-leading, state-of-the-art research site for rare metals will be constructed.

3. Research characteristics (incl. originality and creativity)

This research project is focused on the development of new recycling technologies not only for recovery of rare metals from waste but also for effective utilization of harmful waste that needs expensive treatment to make it harmless. New environmentally sound process technologies for extracting and reusing rare metals from waste will be developed. Green innovation will be promoted through the recycling of rare metals.

4. Anticipated effects and future applications of research

This project will result in the advancement of process engineering of rare metals, which is one of the foremost research fields in the world today, and the emergence of the world’s first nation oriented to advanced resource recycling technology.

Development of Environmentally Sound Recycling Technology of Rare Metals

To increase mineral resource security, fundamental research involving applied engineering is conducted on new recycling technologies for rare metals accumulated as waste in the country. Environmentally sound recycling technologies (green technologies) for rare metals such as platinum group metals, rare earth metals, tantalum, tungsten, titanium, and silicon are developed.

Rare Metals

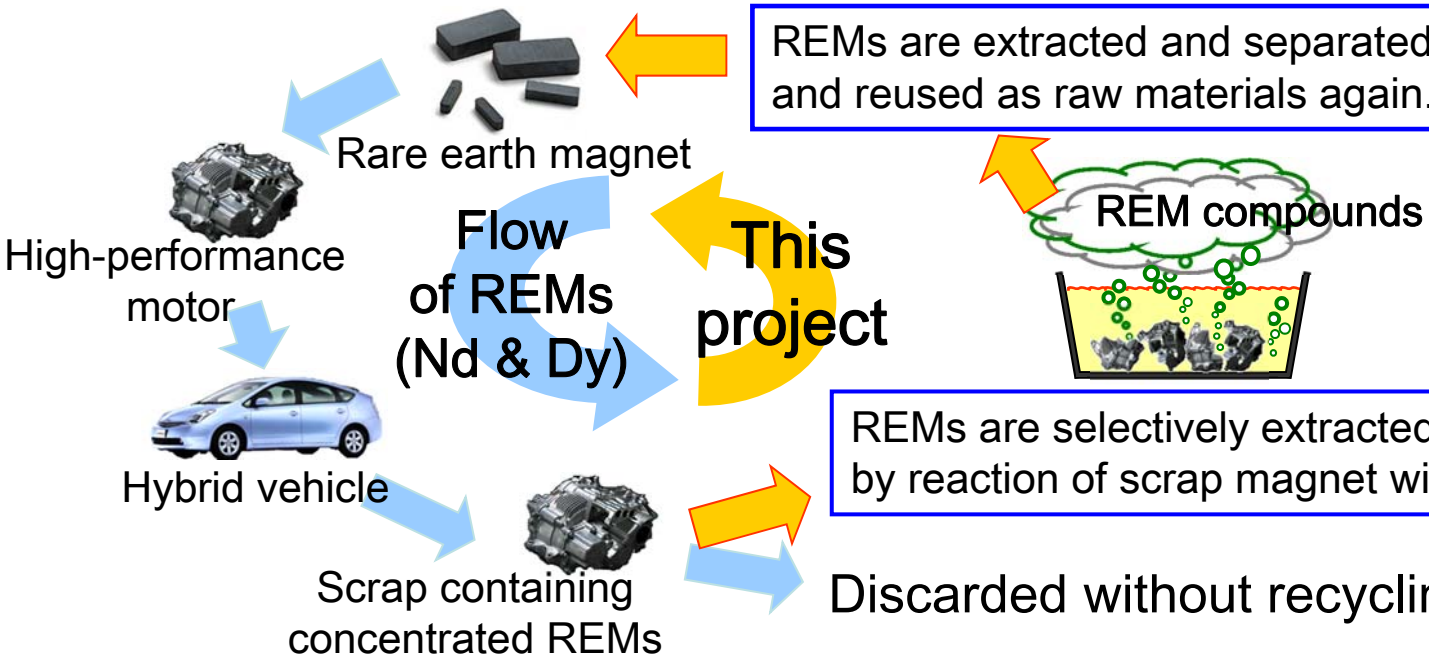
Okabe Lab. fosters international cooperation as leader in the field of rare metals and contributes to the society as the world-leading and state-of-the-art research site for process engineering of rare metals.

Development of New Process for Substance Transformation

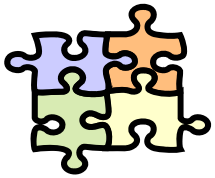
Evolution of Recycling Material Science

Examples of research topics for practical applications:

Development of new recycling process for rare earth metals (REMs)



Development of new recycling process based on the concept of "scrap combination"

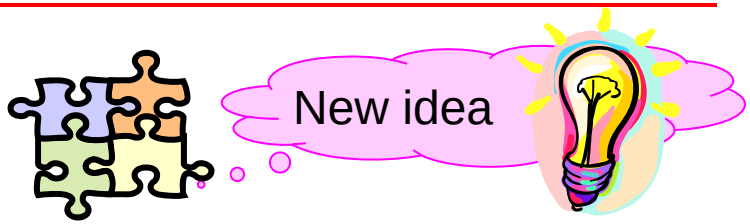


Scrap 1 + Scrap 2

Valuable material 1 + Valuable material 2

(or harmless substance)

Example of idea:



Scrap of platinum group metals (PGMs) (Pt, Pd, Rh, …) + Scrap of magnesium or zinc

Pure PGMs + Small amount of waste or less effluent