

Particle Science and Technology Group

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Current Research

Our group has been carrying out research such as: 1) synthesizing “nanoparticles and microparticles” in an environmentally-friendly way, 2) evaluating and understanding the surface characteristics of the “microparticles (microorganisms)” correctly and putting them into practical use, and 3) utilizing the “microorganisms as microparticles” for resource recycling and environmental cleanup. We will introduce the research content concerning “resource recycling of rare metals by the use of microorganisms”.

“Rare metals” is a general term which refers to metal elements that are scarce on the earth or those that are extremely difficult to extract from raw materials either economically or technically. Today, rare metals are indispensable for high-tech products such as cellular phones, liquid crystal display TVs and hybrid cars. Incidentally, Japan consumes nearly 30% of all rare metals consumed in the world, most of these metals being imported, therefore, it is imperative for Japan to secure a stable supply of these rare metals.

As shown in Fig. 1, we have been researching the technologies to effectively extract rare metals from both raw mineral ore and artificial mineral ore (waste from electric and chemical industries), condense and collect metal components extracted into a liquid solution and, furthermore, transform them to nano/micro-sized highly functional particles. We are proceeding with the research to combine these technologies in an orderly way so that a resource recycling system of rare metals consisting of raw materials, highly functional materials, industrial waste and raw materials can be established, contributing to the promotion of a recycling-oriented society. The techniques of bioleaching to extract rare metals from mineral ore by the action of microorganisms, and biomineralization to reduce and deposit metal ions existing in an aqueous solution on the surface of microorganisms as solid nanoparticles, in particular, have been given much attention as environmentally-friendly technology.

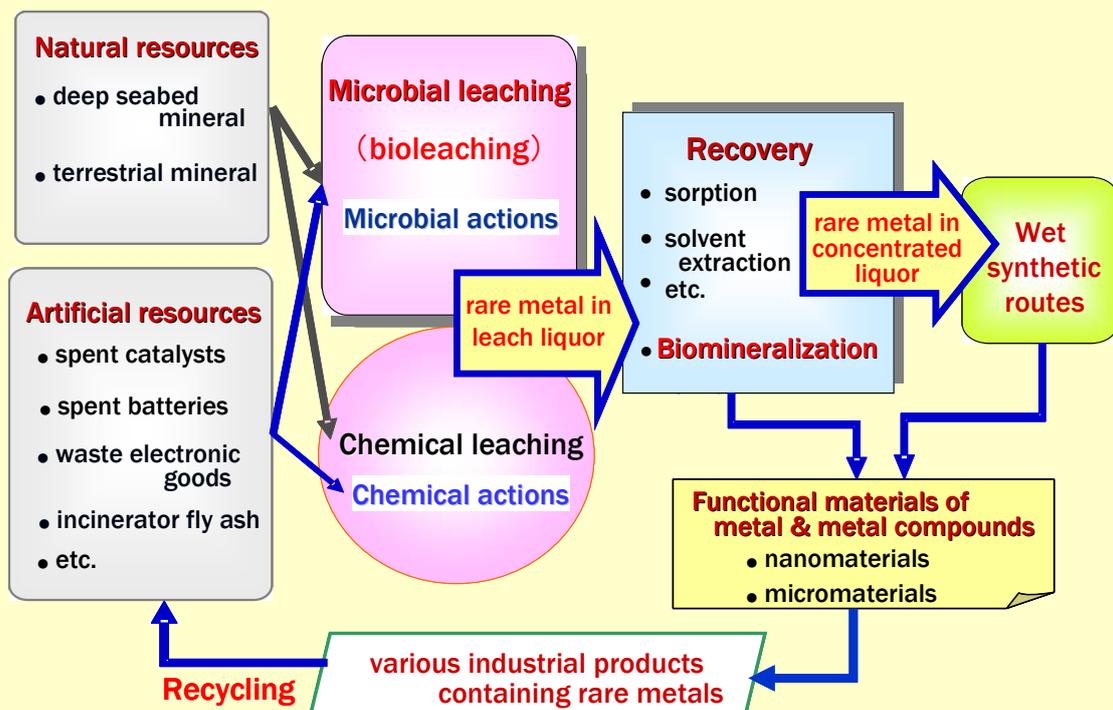


Fig. 1 Recycling system of rare metals