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technology profile

MAGNETIC SEPARATION OF RARE EARTH IONES

Ideas on utilisation

The rare earths such as Neodymium, dysposium, yttrium or gadolinium are important raw materials for microelectronics, high performance magnets or catalysts. In natural and technical occurrences, e.g. Recycling scrap, the rare earths in mixtures with each other or with other elements, while they are needed for the applications mentioned in the purest form possible. An important goal is therefore to develop suitable separation methods for these elements. The special magnetic properties of these elements, which are primarily paramagnetic, are suitable for this purpose. The magnetic separation of rare earth ions from aqueous solutions could be demonstrated by working at the professorship (J. Phys. Chem. Letters 2012, 3, 3559-3564). The operating principle is based on the application of magnetic gradient fields to aqueous solutions containing rare earth ions. Under the effect of the magnetic field gradient force, the solvated rare earth ions migrate into the field gradient and, with appropriate design of the separation cell, can be collected at respective exit channels.

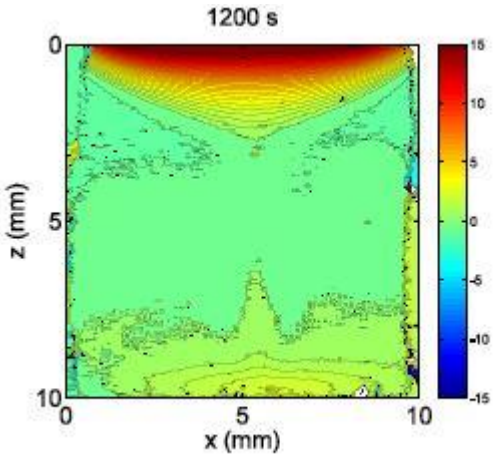

Fig. Enrichment of paramagnetic ions, here Mn (II), which is below the magnet after 20 minutes. Shown is the concentration distribution in mM.

Potential adopters of technology

The recycling of magnets, hard disks and other rare earth-containing valuable materials is a necessary, elegant and environmentally friendly way, in which the dependence of decreasing primary raw materials.

Potential users with whom we want to develop the technology are companies that work in the field of urban mining / recycling. The procedure may also be of interest to recyclables dealers.

Advantages of technology

- easy-to-use technology that can be realized with commercially available permanent magnets
- Environmentally friendly process, free from the use of additional chemicals
- Can be combined with existing rare earth recycling processes

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Market and context of technology

- Previous methods such as liquid-liquid extraction, wet-chemical methods or zone melting process are complex and energy-intensive and therefore very expensive. In addition, a separation of similar metals is often limited.
- Functional principle of the new technology has been proven. At the moment laboratory technology proves the functionality of the technology at small fluid volumes.
- The work on the extension is based on a continuous separation process.

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