

Use of algae to recover REEs from waste materials

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The demand for rare earth elements (REEs) is increasing steadily because of their importance, particularly in the field of high-tech electronics. Therefore the need for more efficient and sustainable mining processes as well as efficient methods for recycling them from industrial waste has risen. The red mud is a byproduct of alumina production from bauxite ore by conventional Bayer process. The samples of red mud show a significant concentration of the lanthanides as well as their homogenous distribution. The luminophores, acquired as powder from electronic waste, comprise mixtures of highly concentrated lanthanides. The aim of the study was to examine the ability of selected species of microalgae to grow in the presence of either red mud or luminophore and to accumulate lanthanides in the cells. The content of lanthanides in biomass was evaluated using ICP-MS. The intracellular localization of lanthanides was followed by fluorescence microscopy. The possible prospect to use algae for alternative recycling of lanthanides or bioremediation was evaluated.