



## An Environmentally Friendly Method for Extracting Rare Earth Elements from Coal and Coal Utilization Byproducts

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**Patent Status:**

Patent Pending

### Description of Technology

Lanthanides, or rare earth elements (REEs), have been increasingly used in renewable energy and energy-efficient technologies because of their unique electronic, magnetic, optical, and catalytic properties. Mining and then extracting is the typical way to obtain these REEs, but because they are present in coal and coal combustion byproducts such as fly ash, reports have confirmed the potential for extraction and separation of REEs from the coal and coal byproducts.

Researchers at the University of Wyoming have invented a way to obtain these REEs from fly ash by using a process called "leaching." Leaching is when a substance is extracted from a solid material that has come into contact with a liquid. The Researchers are using a number of acids including inorganic, organic, and acid mixtures coupled with supercritical CO<sub>2</sub> as the liquid. In tests, up to 88% of REEs were able to be removed from the ashes. This new method makes fly ash, which was once considered a pollutant, into a profitable material.

### Applications

This new leaching technology can be used to extract REEs from coal byproducts. It turns what once was a pollutant into a profitable material.

### Features & Benefits

- 88% of REEs were removed from the ash
- Turns a pollutant into a profitable material



**Figure:** Coal fly ash (a), REEs containing solids (b) 10.8% and (c) 35.6% produced by the team's new green REEs extraction method.

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