Washington University in St. Louis
Office of Technology Management

SUSTAINABLE RARE EARTH ELEMENT EXTRACTION FROM COAL ASH

Jun, Young-Shin, Zhu, Yaguang

Markiewicz, Gregory

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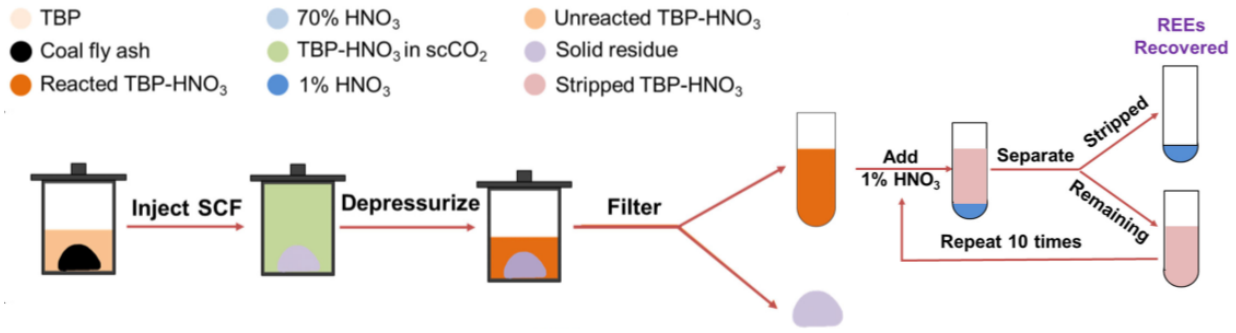
Technology Description

Researchers in Young-Shin Jun's lab at Washington University have developed a more sustainable and efficient process for extracting rare earth elements from coal fly ash using supercritical fluids. Compared to the conventional roasting and acid leaching method, supercritical fluid extraction uses considerably less energy and produces no liquid or organic waste, while also yielding rare earth elements at 10x purity.



Overview of the supercritical fluid extraction process from coal fly ash

Most rare earth elements are currently mined internationally, creating a supply chain vulnerable to geopolitical factors. This technology enables a more robust and sustainable extraction process from coal products like fly ash, reducing our reliance on mined rare earth elements.

Stage of Research

The inventors have demonstrated 10x increased purity and high extraction efficiency using this process, when compared to conventional extraction methods. Further, those results are consistent regardless of the supercritical fluid used: $scCO_2$, scN_2, or scAir.

Applications

- Rare earth element extraction from coal based products:
  - Coal fly ash
  - Coal bottom ash
  - Pulverized coal

Key Advantages

- Yields 10x increased purity
- Produces no liquid or organic waste
- Requires less energy than typical roasting process

Patents: Pending

Related Web Links: Jun Profile & Lab