

*SMaRT Center Weekly Digest*  
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## News

### [Pentagon suspends F-35 deliveries over Chinese alloy in magnet](#)

In a release Wednesday, Lockheed Martin said a magnet in the F-35's Honeywell-made turbomachine — an engine component that provides power to its engine-mounted starter/generator — was recently discovered to have been made with cobalt and samarium alloy that came from China. Lockheed said the alloy for this part is magnetized in the United States.

### [NioCorp's demonstration plant begins testing process improvements and rare earth recovery operations](#)

The demonstration plant project is intended to demonstrate that the Company can extract and separate rare earth elements from ore that NioCorp expects to mine from the Elk Creek site, Quebec, Canada, and that its simplified process for potentially producing niobium, scandium, and titanium is technically and economically feasible. The demonstration plant will process the ore samples in three phases. Phase 1 is designed to demonstrate a new approach to the initial processing of the ore that NioCorp expects to mine from the Project site, subject to receipt of necessary project funding, including calcination, initial leaching, and rare earth extraction. Phase 2 is designed to demonstrate an improved process for the second stage of leaching along with Niobium and Titanium separation. Phase 3 is designed to demonstrate the technical viability of separating high-purity versions of several target magnetic rare earth products from Elk Creek ore samples, as well as confirming previously achieved high recovery rates for high-purity Scandium trioxide.

### [Cornish Lithium secures UK government funding for demonstration plant](#)

Cornish Lithium, the start-up hoping to lead the development of an industry for the battery metal in Britain, has secured funding from UK's national innovation agency to build a demonstration scale processing plant at its Trelavour hard rock lithium project. The unspecified amount from the Innovate UK through the Automotive Transformation Fund (ATF) will help Cornish Lithium build the hydrometallurgical section of the plant, the company said.

### [FPX outlines 43,500 t/y integrated nickel sulphate operation in scoping study](#)

FPX Nickel has announced results of an internal engineering scoping study evaluating the production of nickel sulphate for the electric vehicle battery market from the high-grade awaruite to be produced by the company's Baptiste nickel project in central British Columbia. This study highlights FPX's potential to develop the world's largest integrated nickel sulphate production facility, linking the company directly into the EV battery supply chain via the production of low-cost, low-carbon nickel sulphate over Baptiste's projected 35-year mine life.

### [Honda forms partnership to secure supply of battery metals](#)

Honda Motor Co has formed a partnership with trading company Hanwa Co to secure stable supply of metals used in batteries for electrified vehicles, the Japanese automaker said on Tuesday. Honda will be

able to obtain essential metals such as nickel, cobalt and lithium through the partnership in the medium to long term, it said in a statement.

## Column of the Week

### [The race for US lithium hinges on a fight over a Nevada mine](#)

A judge is weighing a bid to block the mine brought by an unlikely coalition: a rancher who contends the operation will consume precious groundwater that sustains his herd; environmental groups that support electric vehicles but see the vast mining operation as too destructive; and tribal members determined to preserve the legacy, lifestyle and land of their ancestors...

## Technical Papers

### [Adsorption of neodymium, terbium and dysprosium using a synthetic polymer-based magnetic adsorbent](#)

In this study, a polyamide with methine-thiophene and pyrimidine linkages (poly(pyrimidine-thiophene-amide) (PPTA)) was synthesized. Then, magnetic PPTA (M-PPTA) was synthesized using the hydrothermal technique. Using 0.15 g of M-PPTA to test the adsorption of the rare earth elements (50 mg/L) at pH = 5.5, the percentage of adsorption for Dy<sup>3+</sup>, Tb<sup>3+</sup>, and Nd<sup>3+</sup> was 98.41, 97.48, and 95.67, respectively.

### [Recovering rare earth elements via immobilized red algae from ammonium-rich wastewater](#)

Immobilization of acidophilic *Galdieria sulphuraria* (*G. sulphuraria*) by calcium alginate to improve its affinity to positively charged REEs has been used for simultaneous bioremoval of REEs and ammonium. The results indicate that 97.19%, 96.19%, and 98.87% of La, Y, and Sm, respectively, are removed by *G. sulphuraria* beads (GS-BDs).

### [Application of Machine Learning to Characterizing Magma Fertility in Porphyry Cu Deposits](#)

In this study, machine learning models using Random Forest and Deep Neural Network algorithms are utilized to characterize magma fertility. The two models have first been trained using a large trace-element data set of magmatic zircon and then validated on unseen data set during the training process. The performance of both models was evaluated using a fivefold cross-validation technique, which demonstrates that the models provide consistent results and yield good classification accuracy (~90% on average) with low false positive rates.

### [Association of Rare Earths in Different Phases of Marcellus and Haynesville Shale: Implications on Release and Recovery Strategies](#)

A traditional sequential extraction procedure was adopted to understand the association of REYs. Extraction efficiency was assessed by comparing the mineralogy of the pre- and post-sequential extraction samples using XRD. Elemental ratios such as La/Lu, La/Sm, Gd/Lu, Y/Ho, and Ce and Eu anomalies were utilized to understand whole-rock-normalized REY distribution patterns. Further, the distribution pattern in each extracted phase was examined to account for the relative contribution of phases to REY enrichment. The economic potential of these samples was evaluated by calculating HREE/LREE ratios, outlook coefficients, and by comparing their REY levels with those of coal fly ash deposits. Our results indicate that whole-rock REY content in the analyzed shale samples ranged from 295 to 342 ppm, with Haynesville Shale having a higher concentration than the Marcellus Shale sample. All samples exhibited an MREE–HREE-enriched pattern, indicating that the REY content is primarily contributed by carbonate and siliciclastic inputs. However, the average total REY extraction efficiency was only approximately 20% from the Haynesville samples and 9% from the Marcellus sample.

### [Effect of oxidative breakers on organic matter degradation, contaminant mobility and critical mineral release during shale-fracturing fluid interactions in the Marcellus Shale](#)

The use of highly reactive fracturing fluids that include strong oxidizing agents, also known as breakers, can potentially increase well productivity. This study investigated the fluid-rock interactions between Marcellus Shale and synthetic hydraulic fracturing fluid (HFF) solutions comprising three different oxidative breakers. Our results also demonstrate that the addition of oxidative breakers increased the concentration of several major and trace elements in the effluents.

## Funding Opportunities

### [DE-FOA-0002804: Industrial Efficiency and Decarbonization FOA](#)

AMO intends to fund high-impact, applied R&D and pilot-stage technology validation and demonstration activities through this FOA. All applications in Topics 1 through 6 are strongly encouraged to include an industry partner on the project team.

- Tier 1 projects are primarily focused on TRL 4 and TRL 5 R&D activities to validate technology components in a laboratory or relevant environment. For select areas of interest (Area of Interest 3 in Topic 1, and Area of Interest 2 in Topic 6), efforts can begin in TRL 3. The cost share for Tier 1 projects must be at least 20% of the total allowable costs.
- Tier 2 projects can include activities in TRL 4 and 5, but must also include scope to include TRL 6 and/or TRL 7 to conduct system/subsystem prototype or pilot-scale technology validation in a relevant or operational environment. Tier 2 projects should be organized into distinct phases, and should include Phase 2 and/or Phase 3, below:
  - Phase 1: Research and development;

- Phase 2: Design and testing; and
- Phase 3: Installation and demonstration.

Tier 2 applications with technology demonstration integrated into industrial operations must include Phase 3. The cost share for Phase 1 and Phase 2 must be at least 20% of the total allowable costs. For Phase 3, the demonstration phase, the cost share must be at least 50% of total allowable costs.

<b>Topic Area</b>	<b>Tier 1 Maximum Funding Level</b>	<b>Tier 2 Maximum Funding Level</b>
1. Decarbonizing Chemicals	\$3 million	\$10 million
2. Decarbonizing Iron and Steel	\$4 million	\$10 million
3. Decarbonizing Food and Beverage Products	\$3 million	\$6 million
4. Decarbonizing Cement and Concrete	\$4 million	\$10 million
5. Decarbonizing Paper and Forest Products	\$3 million	\$8 million
6. Cross-sector Decarbonization Technologies	\$3 million	\$5 million