SMaRT Center Weekly Digest

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Contents

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News

DOE Funds Next-Generation Rare Earths Processing Research Collaboration

American Rare Earths' wholly owned US subsidiary, Western Rare Earths (WRE), has joined as the industrial partner in a research consortium that includes the technology company, Phinix, LLC and Virginia Tech University. The team was awarded R&D funding by DOE's Office of Energy Efficiency and Renewable Energy Advanced Manufacturing Office in an AMO program known as Critical Materials: Next-Generation Technologies and Field Validation. The consortium will receive up to $500K USD to fund the work.

Hudson Resources and Neo Performance Materials Sign Agreement on the Sarfartoq Rare Earth Element Project in Greenland

The Project hosts a mineral deposit that is enriched in neodymium and praseodymium, two essential elements for rare earth permanent magnets used in electric vehicles, wind turbines, and high-efficiency electric motors and pumps that help reduce greenhouse gas emissions. Located just 60 kilometers from the international airport in Kangerlussuaq, the Project is close to tidewater and a major port facility and is directly adjacent to some of the best hydroelectric potential in Greenland. Hudson receives a nonrefundable initial cash payment of US$250,000 upon signing of the Agreement. Upon receipt of approval from the Greenland government, Hudson will transfer the License to Neo or the SPE. Hudson will receive an additional US$3,250,000 upon closing of the transaction.

New York Times: A Supplier of Rare Earth Metals Turns to Greenland in a Bid to Cut Reliance on Russia

Neo Performance Materials of Canada announced a deal to begin mining in Greenland for the metals, which are a key component for electric cars.

Tomatoes and corncobs used to salvage rare earth elements

Researchers from Penn State University in Pennsylvania used micro- and nanoparticles created from the organic materials to capture neodymium from aqueous solutions. "Waste products like corncobs, wood pulp, cotton and tomato peels often end up in landfills or in compost," said assistant professor Amir Sheikhi, a corresponding author of a paper on the work. "We wanted to transform these waste products into micro- or nanoscale particles capable of extracting rare earth elements from electronic waste."

Namibia Critical Metals: Successful Hydrometallurgical Test Work Completed on Bulk Sample at Lofdal Heavy Rare Earth Deposit

A mineral concentrate was produced by bulk flotation for downstream hydrometallurgical testing. The average cleaner flotation from the bulk test runs produced a concentrate grade of 4.7-6% TREO. A total of three acid bake and water leach tests were completed throughout the current test program to investigate the dissolution of rare earth elements (REE) and the behaviour of gangue minerals through the addition of sulphuric acid at elevated temperatures (300°C) and at a range of acid dosages (1-1.5 t/t

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concentrate basis). These tests showed very good REE recoveries with 96% for yttrium, 95% for dysprosium and 94% for terbium.

Australia's Lynas posts record profit on solid rare earths demand

The world's largest producer of rare earths outside China reported net profit after tax for the year ended June 30 of A$540.8 million ($377.37 million), compared with A$157.1 million a year ago. The miner's full-year revenue rose to A$920 million from A$489.0 million a year earlier.

Volkswagen, Mercedes-Benz team up with Canada in battery materials push

German carmakers Volkswagen and Mercedes-Benz struck battery materials cooperation agreements with mineral-rich Canada on Tuesday, intensifying efforts to secure access to lithium, nickel and cobalt. No financial details were disclosed for the memorandum of understanding (MoU) agreements, which were signed in Canada during a visit by German Chancellor Olaf Scholz and a delegation of German corporate representatives.

Column of the Week

Sulfur shortage: a potential resource crisis looming as the world decarbonises

A projected shortage of sulfuric acid, a crucial chemical in our modern industrial society, could stifle green technology advancement and threaten global food security, according to a new study led by UCL researchers. The study, published in the Royal Geographical Society (with the Institute of British Geographers) journal The Geographical Journal, highlights that global demand for sulfuric acid is set to rise significantly from '246 to 400 million tonnes' by 2040 - a result of more intensive agriculture and the world moving away from fossil fuels. The researchers estimate that this will result in a shortfall in annual supply of between 100 and 320 million tonnes - between 40% and 130% of current supply - depending on how quickly decarbonisation occurs.

Technical Papers

Selective Confinement of Rare-Earth-Metal Hydrates by a Capped Metallo-Cage under Aqueous Conditions

Encapsulation of a hydrated rare-earth metal ion in a hydrophobic cavity was demonstrated under aqueous conditions by a cooperative system of a synthetic coordination cage and a tripodal capping anion. By the cooperation of the cage cavity and the caps, selective recognition and separation of early lanthanoid ions were achieved.

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Preparation of Pyrrolidinyl Diglycolamide Bonded Silica Particles and Its Rare Earth Separation Properties

In this study, 2-[2-oxo-2-(1-pyrrolidinyl)ethoxy]acetic acid (PYRDGA) was synthesized and attached to the silica. The binding strength of SiO2@PYRDGA for rare earths showed a single increasing trend with the radius of rare earth atoms. IR and XPS spectra demonstrated that carbonyl oxygen and ether bond oxygen are binding sites for rare earth ions. SiO2@PYRDGA was used for the chromatographic separation of REEs, and the primary separation of 16 REEs was achieved at pH=2.0 using HNO3 solution as the eluent, and La, Ce, Pr, Nd, Sm, and Eu reached the baseline separation level.

Synthesis of N, O-rich active site porous polymers and their efficient recovery of Gd(III) from solution

Due to the advantage of customizable functional groups of porous organic polymers (POPs), the triazine-based Tb-MEL and hydroxyl-modified triazine-based Tp-MEL were synthesized by a one-step hydrothermal method using nitrogen-rich melamine as the raw material and triformylbenzene (Tb) and 2,4,6-triformylphloroglucinol (Tp), respectively. The fitted maximum adsorption capacity (qmax) [of Gd(III)] is about 136.05 mg/g. The adsorption efficiency for Gd(III) at pH = 7 is close to 100%.

The trace element chemistry of quartz in carbonatite-related REE deposits: Implication for REE exploration

Quartz in carbonatite-related REE deposits has distinguishable compositions. The composition of quartz exhibits systematic, spatial variation in REE deposits. Quartz can be used as an indicator in the exploration of REE deposits.