

1. Introduction. Rare earth resources are abundant in China and account for over 95% of the world's annual production. Thus, product development and technology would surely take advantage of the rare earth resources, greatly improving the added value of rare resources, especially for high-enrichment rare earth elements like La and Ce. 1 Rare earth metals as one ...

The energy-storage efficiency of the pure and rare-earth (La, Eu, Dy and Ho) doped epitaxial PZT thin films are found to be 46 2.34, 44 2.48, 40 2.46, 36 2.49 and 28 2.46%, respectively. It is observed that the value of the samples decreases gradually with the increasing the rare-earth ionic radius.

The improvement of hydrogen storage materials is a key issue for storage and delivery of hydrogen energy before its potential can be realized. As hydrogen storage media, rare-earth hydrogen storage materials have been systematically studied in order to improve storage capacity, kinetics, thermodynamics and electrochemical performance. In this review, we focus ...

This article reviews the applications of REs in traditional metallurgy, biomedicine, magnetism, luminescence, catalysis, and energy storage, where it is surprising to discover the infinite potential of REs in electrochemical pseudocapacitive ...

By sulfurizing rare earth compounds with H<sub>2</sub>S or CS<sub>2</sub> gas at a lower temperature, rare earth sulphides could be synthesized at a lower temperature. To decrease the sulfurization time and examine the optimum sulfurization conditions of rare earth sulphides, YUAN Haibin et al. (2009) synthesized rare earth sulphides powders by sulfurizing their ...

Figure 1 shows a select few of these cleaner energy-critical materials. Rare earth elements (REE) stand out prominently on this list owing to a 100% import reliance, primarily on China, where the vast majority of the world's REE reserves and refining facilities are concentrated (Riddle et al., 2021). Despite its vast REE mineral resources ...

The government has addressed the negative externalities arising from rare earth mining through scientific and reasonable environmental regulation policies, including controlling rare earth resources, raising the standard of a rare earth resource tax, and setting entry thresholds for the scale of rare earth mining (Liao, 2016; Sheng et al., 2017 ...

Yttrium is lighter than the light rare earth elements, but it is included in the heavy rare earth group because of its chemical and physical associations with heavy rare earths in natural deposits. REE follow approximately the Oddo-Harkins law: the single porcentual composition within the different minerals where they can be

found (bastnaesite ...

REEs are often categorised into two sub-groups as light rare earth elements (LREEs) and heavy rare earth elements (HREEs). The elements from 57 La to 63 Eu are considered as LREEs, whereas the elements from 64 Gd to 71 Lu, including Y are categorised as HREEs. These two categories of REEs occur in same deposits altogether except Sc.

Rare earths include the chemical elements of the third subgroup of the periodic table (with the exception of actinium) and the lanthanides, a total of 17 elements. ... a not-for-profit association founded by several institutes of the ETH Zurich and Agroscope ... Bailey performed a sensitivity analysis for 57 energy-related inputs. Additionally ...

Rare earth substitution enhances the activation, absorption/desorption properties of hydrogen storage alloys, a crucial research area. Despite the extensive variety of A-site elements in multicomponent alloys, there remains a scarcity of reports on how to enhance the hydrogen storage capacity of alloys by substituting different elements with rare earth elements ...

Rare-earth-metal-based materials have emerged as frontrunners in the quest for high-performance hydrogen storage solutions, offering a paradigm shift in clean energy technologies. This comprehensive review delves into the cutting-edge advancements, challenges, and future prospects of these materials ...

CeO<sub>2</sub> is an important rare earth (RE) oxide and has served as a typical oxygen storage material in practical applications. In the present study, the oxygen storage capacity (OSC) of CeO<sub>2</sub> was enhanced by doping with other rare earth ions (RE, RE = Yb, Y, Sm and La). A series of Undoped and RE-doped CeO<sub>2</sub> with different doping levels were synthesized using a ...

In the last 10 years, the world has come to realize that the supply of rare-earths is critical in staving off catastrophic climate change. Rare-earths are essential to produce many modern "green" technologies, including batteries, semiconductors and clean energy (Economist, 2021; Jyothi et al., 2020). These rare-earth elements (REE) include Scandium (Sc) - used for ...

Reference W&#252;bbeke 25 Overall, China uses 60% of world's rare earth production. 26 Among the other major consumers is Japan, which consumed 20,175 mt of rare earths in 2016. 27 11,141 mt or 55% of the total use was sourced from China, 4237 mt from France, and 2623 mt from Vietnam.

The analysis focuses exclusively on hypothetical rare earth operations, established to convert coal ash from the existing coal stations into rare earths. 3 The baseline results, which are presented in Section 3.1, indicate that extracting REOs from PRB coal ash is a potentially feasible method of establishing domestic rare earth production ...

# Profit analysis of rare earth energy storage

In light of the global energy transition, the current climate agenda, green initiatives, rapid growth in the electronics industry, and digital transformation, the role of rare-earth metals (REMs) is becoming more and more noticeable (Baldi et al., 2014; Dominish et al., 2019; Gielen, 2021). These metals are needed in the aerospace industry, microelectronics ...

However, the majority of rare earth elements show RE 3+ /RE 2+ or RE 4+ /RE 3+ redox coupling, laying the thermodynamic groundwork for their employment in pseudocapacitive energy storage. 196 Rare earth oxides are the largest group of rare earth compounds that are easily manufactured, structurally stable, corrosion-resistant, and harmless to ...

In response, Baotou Steel replied that the state implements strict mandatory planning management over the rare earth industry, and all compliant rare earth enterprises belong to six major rare earth groups, and rare earth raw material products can only be sold to six major groups. the common practice of the six major groups is that raw ...

Keywords: environmental impact, life-cycle assessment, life-cycle inventory, energy technology, rare-earth elements. Citation: Navarro J and Zhao F (2014) Life-cycle assessment of the production of rare-earth elements for energy applications: a review. *Front. Energy Res.* 2:45. doi: 10.3389/fenrg.2014.00045. Received: 04 June 2014; Accepted: 13 ...

Rare earth elements (REEs) are termed the "vitamins" and "spice" of a modern economy (Dent 2012; Zepf 2013) because adding small quantities of REEs to metals substantially improve the latter's properties. REEs consist of seventeen elements that are commonly added to elements like iron and boron, to produce materials that neither could achieve alone (Koerth ...

They provide us with a conservative estimate of demand for the purpose of this analysis (IPCC 2018). ... while pollution from mine processes and storage of residual tailings can lead to widespread chemical imbalances and toxic contamination (Filho 2016; Xiang 2016; Ganguli 2018). ... As we look to the future of clean energy and the role of rare ...

1. Introduction. China has the world's richest proven rare earth reserves, and the variety, quality, output, and export of rare earths frequently rank first in the world [1, 2], making it critical to the global rare earth supply. China is a large rare earth country that has pushed for related rare earth research, development, and use in the global development and progress of ...

Liu and Liang (2020) used CiteSpace software and based on bibliometrics and knowledge graph analysis methods to analyze the progress and hotspots of China's rare earth export research from 1993 to 2019, and pointed out that the future research directions in the field of rare earth exports mainly focus on export pricing and sustainable ...



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