Hydrogen energy storage patent japan

What is a hydrogen patent?

Their patent portfolios are mainly focused on production by electrolysis and applications based on fuel cells but also extend to established technologies for the storage and distribution of liquid or gaseous hydrogen, an area of focus for these countries which plan to import stored hydrogen in the near future.

Are hydrogen patents a good indicator of innovation?

Patents are strong indicators of innovation activitywhich can give very detailed insights into the state and direction of the science. This study,which combines the expertise of the International Energy Agency and the European Patent Office,is the most comprehensive,global and up-to-date investigation of hydrogen-related patenting so far.

Can hydrogen improve energy security in Japan?

"Hydrogen can contribute to diversifying our energy resources, which will enhance our energy security," explains Toshiyuki Shirai, director of the Hydrogen and Fuel Cells Strategy Office at Ministry of Economy, Trade and Industry (METI). The Japanese government has pledged to become a carbon-free society by 2050.

Which countries have the most patents on hydrogen?

According to this report,the European Union,Japan,and USAhold 67-78 % of the global patents on hydrogen production,storage,transmission,and end-use applications,while Korea and China hold about 8-10 %.

What is the future of hydrogen technology in transportation?

The roadmap and market outlook for hydrogen technologies in transportation are discussed in detail by WIPO,the World Intellectual Property Organization,in their 2022 Patent Landscape Report . According to this report,by 2050,multiple countries (e.g.,US,Europe,China,Japan &South Korea) will touchstone the "Net Zero Scenario".

How fast does hydrogen patenting grow in Japan?

Hydrogen patenting grew even faster in Japan than in Europe during the past decade,with compound average growth rates of 6.2% and 4.5%respectively between 2011 and 2020. The US contributed 20% of all IPF publications related to hydrogen between 2011 and 2020 and is the only major region where the number of IPFs decreased during the past decade.

The United States, with 20% of all hydrogen-related patents, is the only major innovation centre to see international hydrogen patent applications decline in the past decade. International patenting activity in hydrogen technologies remained modest in South Korea and China but is on the rise.

patent knowledge, it provides the most comprehensive and up-to-date global review of patenting trends in a broad range of technologies - from the production of hydrogen to its storage, distribution and transformation,

through to its end-use applications across many different industries. Because patent information is the earliest

Through the retrieval of previous research on hydrogen energy patents, it is found that in 2009 [22], reviewed hydrogen production patents and paid special attention to the future trend in this field [23]. Made a comparative analysis of advanced hydrogen production technology patents in China, Japan, South Korea, the European Union and the ...

Patents directed to hydrogen storage in liquid organic hydrogen carriers (LOHC) and ammonia cracking have rapidly increased between 2011 and 2020, with average annual growth rates of 12.5% and 7.8% respectively. Japan has a considerable specialisation in ammonia cracking with 61% of the published IPFs over this period.

A range of hydrogen carriers, including metal hydrides, ammonia, and liquid organic hydrogen carriers (LOHCs), has been explored. Metal hydrides offer high storage capacity but have slow hydrogen uptake and release kinetics [13], [14].Ammonia has a high energy density but requires specialized production, storage, and distribution infrastructure [15], [16], [17].

Technology trend studies on patent analyses of hydrogen technology are critical in understanding the status of present and future technology, as well as, its market opportunity. However, the studies were mostly limited to specific countries and lacked the details of green hydrogen production technology. In this study, a patent analysis forecasting future green ...

Hydrogen is a versatile energy storage medium with significant potential for integration into the modernized grid.Advanced materials for hydrogen energy storage technologies including adsorbents, metal hydrides, and chemical carriers play a key role in bringing hydrogen to its full potential.The U.S. Department of Energy Hydrogen and Fuel Cell ...

Toyota City, Japan, March 15, 2022-Toyota Motor Corporation (Toyota) announced today that it has developed a hydrogen storage module that integrates multiple resin high-pressure hydrogen tanks at 70 MPa for automobiles-already proven in the "Mirai" fuel cell vehicle (FCEV)- and safety devices such as a hydrogen detector and an automatic shut-off switch.

hydrogen production at Latrobe Valley in Australia; (ii) hydrogen liquefaction and storage at Hastings in Australia; (iii) marine transportation of liquefied hydrogen from Australia to Japan; and (iv) unloading and storage of liquefied hydrogen in Kobe, Japan. This project will deploy the world"s first purpose-built liquefied hydrogen

(click to enlarge) Innovation responds to the need to tackle climate change. Hydrogen production technologies accounted for the largest number of hydrogen patents overall in the 2011-2020 period, and the report finds that across all segments of the hydrogen value chain, low-emission innovations generated more than twice the number of international patents than established ...

PDF | On Dec 1, 2022, Shiqi Zhang and others published Overview of US patents for energy management of renewable energy systems with hydrogen | Find, read and cite all the research you need on ...

First, it reconfirms that Japan"s hydrogen policy is based on the premise of S+3Es (safety + energy security, economic efficiency, and environment) amid the Russia-Ukraine War and the global ...

The European Union and Japan top hydrogen patents globally, according to a patents analysis by the European Patent Office (EPO) and the International Energy Agency (IEA). The report covers a broad spectrum of hydrogen technologies, encompassing end-use applications and hydrogen supply, storage, distribution, and transformation between 2011 - 2020.

It covers technologies for the full range of hydrogen supply, storage, distribution, transformation and end-user applications, as well as introducing new search strategies to compare ...

2 storage tank Hydrogen production Hydrogen transportation/storage Hydrogen use CO 2 capture and storage (CCS) CO 2-free hydrogen Cheap renewable energy Low-cost hydrogen produced from an untapped resource (lignite) and plentiful renewable energy ?Country of use (Japan)? Hydrogen stations, FCV, etc. Transportation equipment Combined cycle ...

Energy Storage Patents | Hydrogen . image credit: Irena. Charley Rattan 3,663,593 . Global Hydrogen Trainer & Advisor, Charley Rattan Associates. Charley Rattan, Upskilling, advising and informing the global energy transition. Charley heads Charley Rattan Associates, a team of seasoned trainers and advisors driving forwards the energy...

Europe and Japan led in terms of new global hydrogen patent applications in the 2011-20 period, according to a new report by the IEA and the EPO.. Japan was the region in which the number of new ...

When the IEA released its special report on The Future of Hydrogen for the G20 in 2019, only France, Japan and Korea had hydrogen strategies, establishing themselves as innovation forerunners in the race to a hydrogen future, which is reflected in the global patent filing data (Figure 2). Japan has historically been interested in developing hydrogen for use as a cleaner, ...

Future energy systems will be determined by the increasing relevance of solar and wind energy. Crude oil and gas prices are expected to increase in the long run, and penalties for CO2 emissions will become a relevant economic factor. Solar- and wind-powered electricity will become significantly cheaper, such that hydrogen produced from electrolysis will be ...

According to this report, the European Union, Japan, and USA hold 67-78 % of the global patents on hydrogen production, storage, transmission, and end-use applications, ...

Hydrogen is considered a promising energy carrier for the future, due to its abundance, high energy content

(142 MJ/kg) and its ability to be employed both in fuel cells and combustion engines, in stationary or mobile applications, potentially producing only H 2 O as an environmentally benign by-product. Hydrogen can also be generated from water using ...

Amid calls for a global conversion to clean energy, Japan is leading the world by applying its technological strengths, such as introducing the world"s first commercially viable fuel-cell vehicle (FCV), moving forward to the realization of a hydrogen society. Japan is also showing leadership in other ways, such as through the action plan ...

589 fuel cell patents (52%) 398 hydrogen production and delivery patents (35%) 150 hydrogen storage patents (13%) 29% of all patents are available for license or licensed 41% are actively being used in R& D o Three types of organizations received patents National laboratories (35% overall) lead in hydrogen storage R& D

The hydrogen energy industry, as one of the most important directions for future energy transformation, can promote the sustainable development of the global economy and of society. China has raised the development of hydrogen energy to a strategic position. Based on the patent data in the past two decades, this study investigates the collaborative innovation ...

the area of hydrogen station patents in Japan. Kobe Steel, Nippon Oil, T oyota and Honda are the top four companies . ... storage and conversion for hydrogen energy. Finally, hydrogen application ...

Toyota, an Industrial Property (IP) leader in fuel cells, including fuel cell vehicles. Indeed, for 20 years, Toyota Group has built up a significant fuel cell-related patent portfolio with 12,000+ patented inventions - currently the largest worldwide. As the chemical energy storage sector boomed in the mid-2000s, matching its peak inventive activity in the domain, the Group ...

Hydrogen gas storage has been widely discussed in recently granted patents. The patent also refers to two additional technologies: gravity storage and thermal energy storage. Hydrogen requires extensive logistics to be utilized on a global scale. It is essential to keep its focus on safety during the transport process.

Innovation in hydrogen is shifting towards low-emission solutions, with Europe and Japan in the lead and the United States losing ground, according to a new joint study of hydrogen ...

A hydrogen fueling station in Seoul: South Korea is focusing on end-use applications for hydrogen, according to a study by the European Patent Office and the International Energy Agency ...

Safe and flexible hydrogen storage technology (HST) emerges as a crucial element in driving the industrialization of hydrogen energy. Consequently, HSTs are being extensively investigated globally, with an increasing number diffusing beyond national boundaries through transnational patent applications.

The article discusses 10 Hydrogen energy storage companies and startups bringing innovations and

technologies for better energy distribution. ... Japan. This partnership aims to market GKN Hydrogen"s metal hydride solutions in Japan. The collaboration focuses on decarbonizing Japanese infrastructure and industrial facilities, including ...

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