

interface of SOFC and battery, a DC-PPS is an appropriate candidate for the integration of SOFCs and batteries. However, because of the major difference in dynamics and efficiency characteristics of gas engine, SOFC, and battery, enabling this complex PPS with these novel energy sources is a difficult challenge. * Corresponding author.

FuelCell Energy, Inc., a leading manufacturer of ultra-clean, efficient and reliable fuel cell power plants, announced a \$3.8 million contract award from the U.S. Navy to develop and test a Hybrid Solid Oxide Fuel Cell (SOFC)-Battery power system for large displacement undersea vehicle propulsion. The objective of the project is to develop a refuelable power [...]

A novel SOFC auxiliary power unit (APU) system with ethanol on-board reforming aiming at vehicle application and the conceptual SOFC-APU system design is identified with the trade-off between system efficiency and ethanol flow from the startup and stable operation phase.

Research on large-signal stability of SOFC-lithium battery ship DC microgrid Yibin Fang¹, Wanneng Yu^{1,2*}, Weiqiang Liao^{1,2,3}, Rongfeng Yang^{1,2}, Chenghan Luo¹, Changkun Zhang¹ and Xin Dong¹ ¹School of Marine Engineering, Jimei University, Xiamen, China, ²Marine Engineering College and Key Laboratory of Fujian Province Marine and Ocean Engineering, ...

The developed PV-SOFC-Battery based standalone hybrid system during this work .The analysis of the developed model is done PV ARRAY (PVA) & SOFC BOTH. HYBRID SOLAR SOFC The SOFC is not working in ...

Request PDF | Simulation of a SOFC/Battery powered vehicle | Solid oxide fuel cells (SOFCs) have received attention in the transport sector for use as auxiliary power units or range extenders, due ...

The battery capacity is reduced to 50% compared to the BEV reference and the vehicle runs mainly with the SOFC activated, which has to charge the battery and support the powertrain simultaneously. This behaviour is more pronounced considering LNG with a resulting energy consumption of 23 kWh/100 km compared to the 14 kWh/100 km of the Nissan ...

In the frame of a European research project (ONSITE - Operation of a Novel Sofc-battery Integrated hybrid for Telecommunication Energy systems) funded by FCH-JU, a hybrid (fuel cells and batteries) power production system addressed to ICT equipment was designed, developed, and tested. ... In particular, using solid oxide fuel cells as ...

SOFC stands for Solid Oxide Fuel Cell. The "Solid Oxide" part of the name refers to the type of electrolyte

that is used. ... system manufacturers are also offering units for battery electric vehicle range-extendors (BEVRE), aerospace and drone applications and rucksack sized mobile units for military and humanitarian aid applications ...

Hybrid SOFC-Battery UUV Power System Process Development The power system utilizes an integrated combination of a solid oxide fuel cell and a battery to satisfy the fluctuating demand of the characteristic LDUUV load profile. This synergistic combination allows the fuel cell to operate at modest and nearly constant

100kW SOFC Integrated Modules Cathode Air System Fuel Desulfurizer Integrated Anode Recycle System EBoP Inverter/Transformer Gas Controls & Plant Controls Fuel and Purge System Start-Up Water Treatment System o Includes (2) 100kW SOFC stack modules designed to operate independently o

A novel liquid carbon dioxide battery is proposed as an instrument for load management within SOFC power generation systems. Within SOFC integrated systems, these batteries demonstrate a distinctive capability to regulate the output power, whilst concurrently capturing low-grade thermal energy from waste heat recovery subsystems.

The mathematical models of liquid carbon dioxide battery and SOFC system integrated with thermal energy recovery are developed. The system performance was comprehensively evaluated via energy and exergy analyses. The results of parameter sensitivity analysis indicate that the liquid carbon dioxide battery can achieve the maximum round-trip ...

The EU project Nautilus aims to implement SOFC/Li-ion battery hybrids into cruise ships for high fuel efficiency and low emissions. Two individual models of a SOFC and a Li-ion battery shall be validated using experimental data. For this, a SOFC / battery hybrid proof of concept at the DLR test-site is prepared and tested in real and digital ...

Among these, SOFC is a high temperature fuel cell that use solid electrolyte, typically dense Ytria-stabilized zirconia, for its operation [10].Furthermore, as compared to other fuel cells, the SOFC allows the use of variety of fuels such as hydrogen, hydrocarbons, carbon monoxide etc. [11] Besides their several advantages, SOFC"s have high operational ...

The integration of solid oxide fuel cell (SOFC) and energy storage mechanisms is a key method for achieving energy infrastructure transformation and energy conservation and emission reduction. When integrated with storage solutions, SOFC enables dynamic power output adjustment, facilitating a responsive match to variable electricity demands across the diurnal ...

Comparative techno-economic assessment of integrated PV-SOFC and PV-Battery hybrid system for natural gas processing plants ... PV-SOFC"s IRR is 3% and has a positive NPV of 5 Million USD\$ for an

Aiming at the solid oxide fuel cell (SOFC) applied to the ship DC microgrid in the face of pulse load disturbance is prone to make the SOFC voltage drop too large leading to the DC grid oscillation problem. In this paper, a stability criterion method for SOFC-Li battery DC system based on hybrid potential function is proposed. Firstly, a mathematical model of ...

SOFC System for Battery Electric Vehicle Range Extension: Results of the First Half of the Mestrex Project. Vincent Lawlor 1, Michael Reissig 1, Julian Makinson 1 and Juergen Rechberger 1 ... An SOFC system has been specially designed for a fuel mixture containing water and ethanol. Targets for the system include 5kW Net power output, a 50% net ...

However, only using SOFC lacks the ability of fast load tracking, so the SOFC and battery hybrid power system is considered for the power supply of the monitoring station. This work presents the design, analysis process of the controller of the hybrid power system. ... Solid oxide fuel cells are a promising alternative energy source for new ...

OverviewIntroductionOperationPolarizationsMechanical PropertiesTargetResearchSee alsoSolid oxide fuel cells are a class of fuel cells characterized by the use of a solid oxide material as the electrolyte. SOFCs use a solid oxide electrolyte to conduct negative oxygen ions from the cathode to the anode. The electrochemical oxidation of the hydrogen, carbon monoxide or other organic intermediates by oxygen ions thus occurs on the anode side. More recently, proton-conducting SOFCs (PC-SOFC) are being developed which transport protons instead of oxygen ...

As shown in FIG. 1, in an SOFC type battery, the oxidant, on the cathode side (air, O_2), is reduced by electrons coming from the anode, and the fuel (CH_4 , H_2 , methanol), on the anode side, is oxidized by the oxygen ions coming from the cathode. According to the type of electrode used (anionic or protonic conduction), one of the two ions formed (O^{2-} or H^+) crosses the ...

The utility model relates to a solid oxide fuel cell (SOFC) battery, in particular to separation liners, which serve to create a continuous sealing perimeter along the fuel cell contour and to separate the sealant and gas channels. The utility model can be used for the manufacture of power plants based on high-temperature fuel cells of planar geometry.

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Company profile: One of the fuel cell manufacturers in China WEICHAI is actively deploying the SOFC business. In 2018, it became the largest shareholder of Ceres Power in the UK. The two parties plan to establish a joint venture company in Weifang, China, to carry out comprehensive cooperation in the SOFC field and promote the commercialization of SOFC in the Chinese ...

Join us as the 19th International Symposium on Solid Oxide Fuel Cells (SOFC-XIX) comes to the historic Münchenbryggeriet in Stockholm, Sweden, from July 13-18, 2025. Since 1989, this international conference has brought together scientists, engineers, and researchers from academia, industry, and government laboratories to share results and ...

Solid oxide fuel cells (SOFCs) have received attention in the transport sector for use as auxiliary power units or range extenders, due to the high electrical efficiency and fuelling options using existing fuel infra structure. The present work proposes an SOFC/battery powered vehicle using compressed natural gas (CNG), liquefied natural gas (LNG) or liquefied petroleum gas (LPG) ...

This paper provides an optimal load sharing and arrangement strategy (LSAS) for a hybrid power system which combines a SOFC stack, a SC module and a battery bank that support local grid.

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