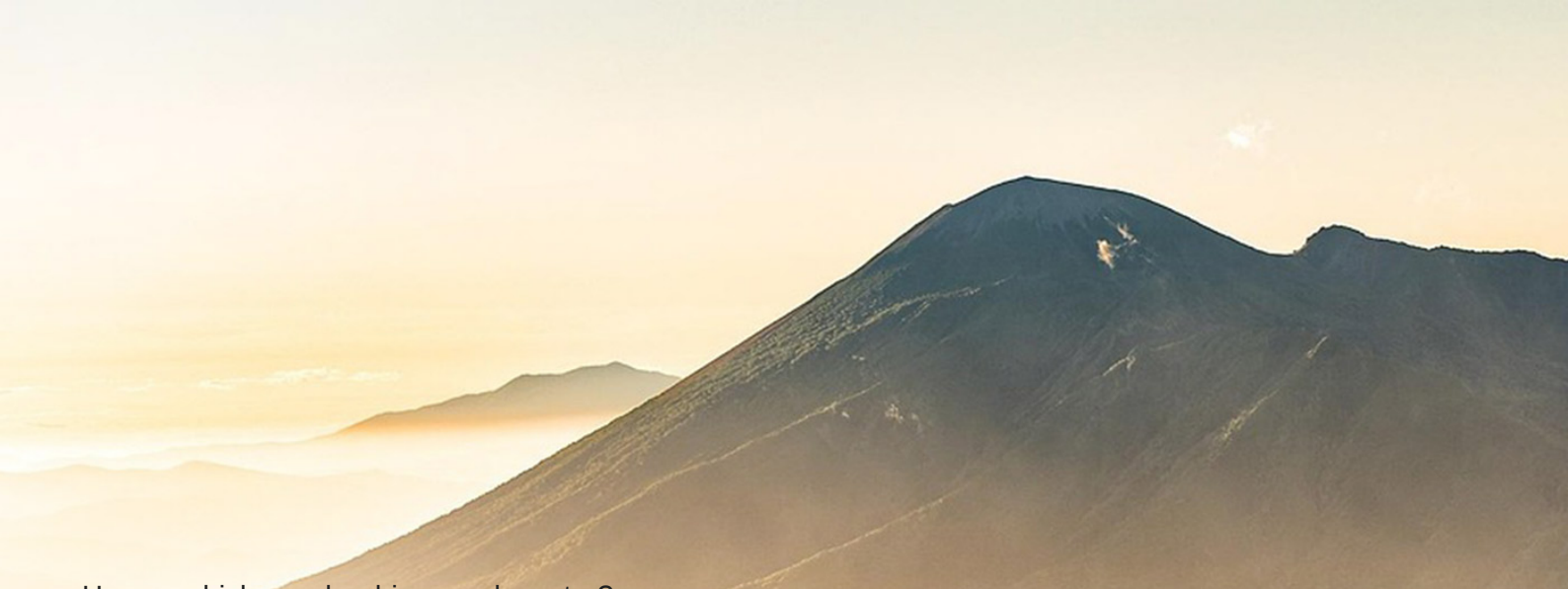


How a vehicle can be driven underwater?

A vehicle can be driven underwater using power systems and environmental energy conversion by applying ocean thermal energy to change the vehicle's buoyancy and commutating the electrical power generated from a mini WECS (Wave Energy Conversion System) installed inside the vehicle. Solar panels can also be installed on the surface of the vehicle to contribute to the power generation.

Can hybrid power systems be used in underwater vehicles?

Hybrid power systems can be used in unmanned underwater vehicles*. According to Griffiths,hybrid fuel/cell battery energy systems for AUVs (Autonomous Underwater Vehicles) can be modeled realistically using a virtual test bed (VTB) for power systems. Q. Cai proposed a hybrid fuel cell/battery power system for underwater vehicles.

Which power supply is best for unmanned underwater vehicles?

Environmental energy conversion is the most promising choice of power supply for unmanned underwater vehicles (ROVs),as represented in Section 5. It is giant,clean,and regenerative,and has a brighter future and more applications.

How can environmental energy be used to power underwater vehicles?

Environmental energy can be used to power underwater vehicles in a huge,clean,and renewableway,helping the vehicle complete long duration missions,even unmanned station keeping missions. Solar energy,ocean thermal energy,and wave energyare some forms of environmental energy and their conversions are discussed in Section 4.

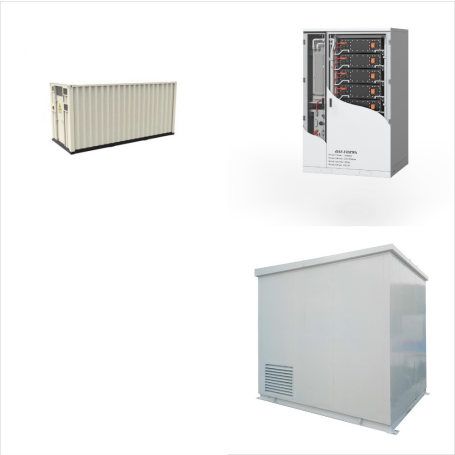
What are autonomous underwater vehicles?

Autonomous underwater vehicles (AUVs) are programmable, robotic vehicles that, depending on their design, can drift, drive, or glide through the ocean without real-time control by human operators . In this paper we will limit our discussion to AUVs that can follow a planned trajectory with a chosen depth profile, thus excluding gliders.

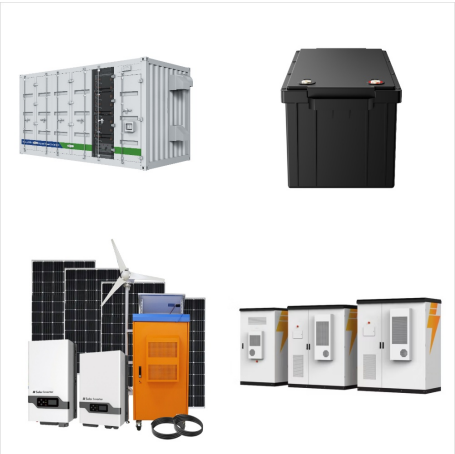
ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE

What are the different types of unmanned underwater vehicles?

The present unmanned underwater vehicles can mainly be classified into three types: remote operated underwater vehicles (ROVs),autonomous underwater vehicles (AUVs),and autonomous underwater gliders (AUGs). They are applied to complete different missions under different working conditions.

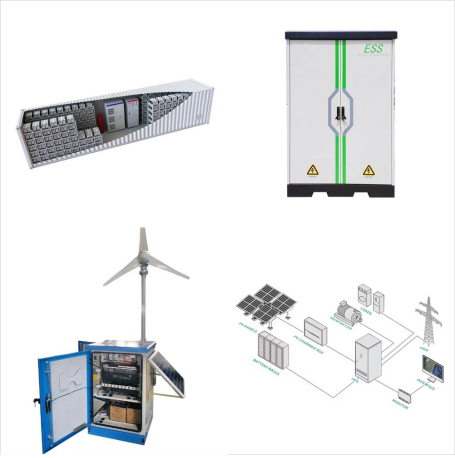


Semantic Scholar extracted view of "Aluminum???hydrogen peroxide fuel-cell studies" by David J. Brodrecht et al. The alkaline aluminium/hydrogen peroxide power source in the Hugin II unmanned underwater vehicle. ?. 1999; 85. Save. Aluminum-hydrogen peroxide power system for an unmanned underwater vehicle. G.D. Deuchars J. Hill J

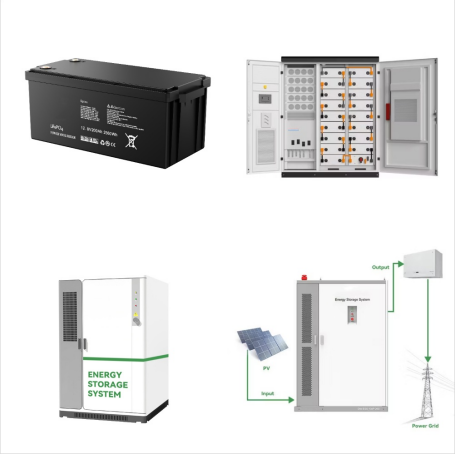


A modular approach to UUV (unmanned underwater vehicle) power source design and construction is described. A range of output power for near term UUVs from 300 W to 5 kW and a range of energy capacity from 15 to 500 kWh is considered. The different power and energy requirements are all met by use of a modular aluminum-oxygen semi-fuel cell with essentially ???

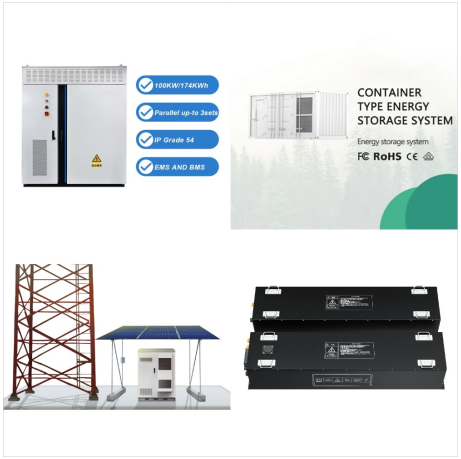
ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE



a large displacement unmanned underwater vehicle (LDUUV) [21]. One of these contracts resulted in a successful demon-stration in an AUV in 2015, and General Atomics completed a 46-day demonstration of their Aluminium Power System in 2018 [22]. The latter system uses hydrogen generated by the reaction between aluminium and water while oxygen is

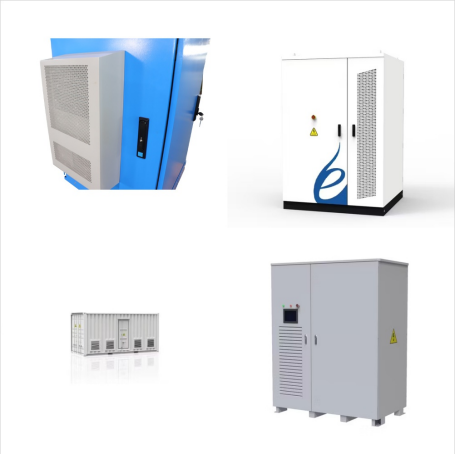


An unmanned underwater vehicle (UUV) or autonomous underwater vehicle (AUV) is a marine robot [1] used for a wide range of oceanographic and military tasks including underwater surveys, inspection

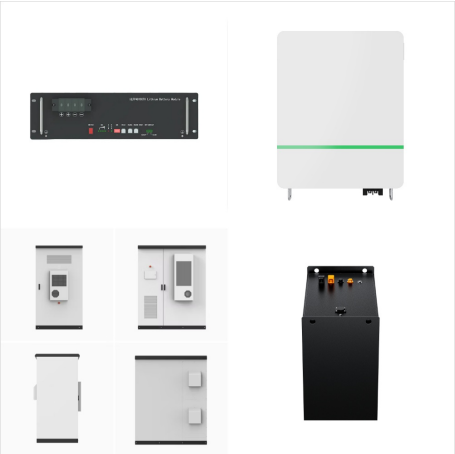


Research in using aluminum as a fuel can be traced back more than 50 years. Note that all previous attempts to produce power from an aluminum-water reaction have been hindered by passivation from the oxide layer. The thin aluminum oxide layer that forms naturally on the Table 1. Comparison of Energy Options for Underwater Vehicles Energy

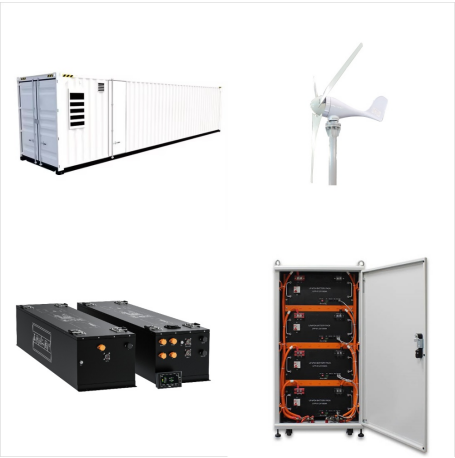
ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE



Autonomous Underwater Vehicles (AUVs) are vehicles that are primarily used to accomplish oceanographic research data collection and auxiliary offshore tasks. At the present time, they are usually powered by lithium-ion secondary batteries, which have insufficient specific energies. In order for this technology to achieve a mature state, increased endurance is required. Fuel cell ???

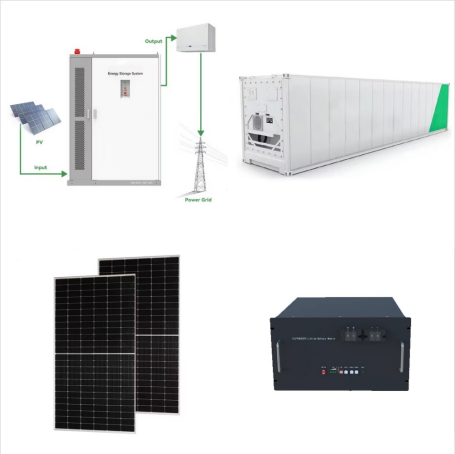


In 1993, The Norwegian Defence Research Establishment (FFI) demonstrated AUV-Demo, an unmanned (untethered) underwater vehicle (UUV), powered by a magnesium/dissolved oxygen seawater battery (SWB). This technology showed that an underwater range of at least 1000 nautical miles at a speed of 4 knots was possible, but also that the maximum hotel load this ???

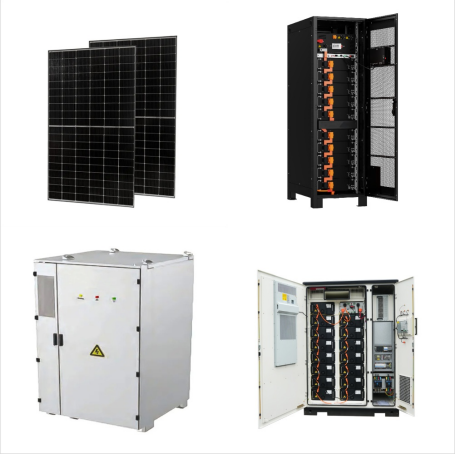


One system under development is a novel Aluminum/Hydrogen-Peroxide pressure-compensated semi-fuel cell system that will deliver 80 kWh at 300 W for a deep-sea autonomous underwater vehicle (AUV). This will permit over 11 days of uninterrupted full-power operation without a ???

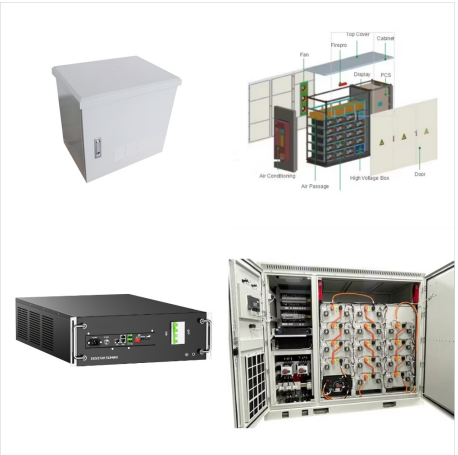
ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE



Alupower Canada Limited and the Department of National Defence with CRAD funding and DGMEM engineering support are designing and constructing a fuel cell power system (FCPS) to power small unmanned vehicles (UUVs). The ARCS 1, a DND/DREP owned experimental unmanned submersible, has been chosen as the trial vessel. The FCPS will provide sufficient ???



Improving the subsea endurance and the power system efficiency of unmanned underwater vehicles (UUVs) has become more important in recent years as their growing demands in different applications. 2018: elsevier. [25]. Weydahl, H., et al., "Fuel cell systems for Hydrogen, Fuel Cell & Energy Storage 10 (2023) 33-50 long-endurance autonomous



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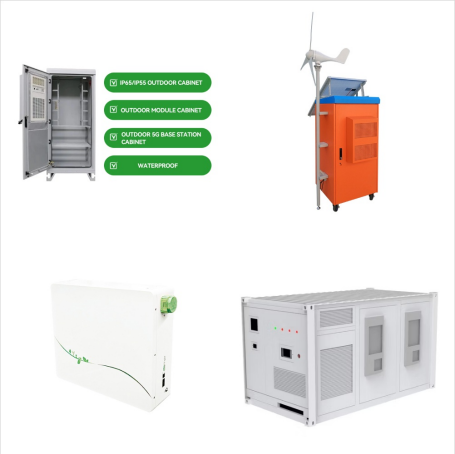
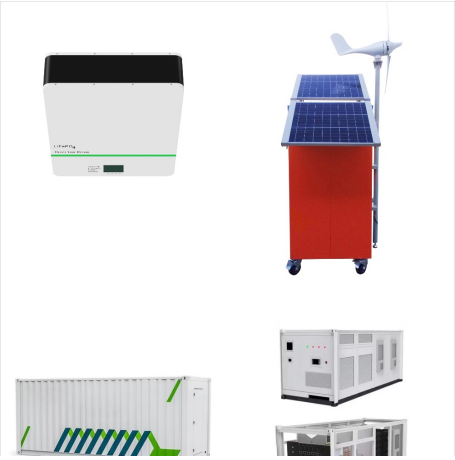
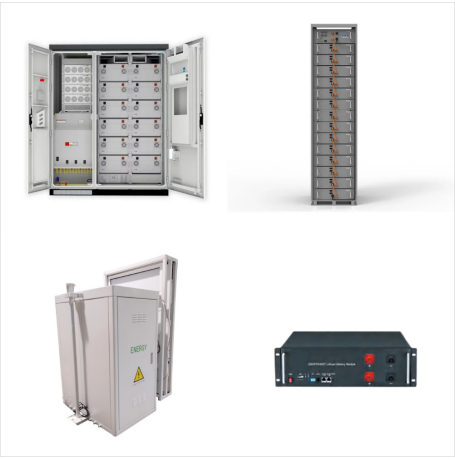


The state of the art is represented by the HUGIN AUV[2]. This vehicle is powered by a Alkaline Aluminium/Hydrogen peroxide semi-fuel cell. This paper will present an alternative power generation system based on a Proton Exchange Membrane (PEM) fuel cell fed by pure hydrogen and oxygen produced by a replaceable chemical storage for AUV.



Additionally, General Atomics Electromagnetic Systems Group (GAS-EMS) developed the aluminum power system (ALPS), an FCES that uses a custom aluminum alloy for hydrogen supply. This system was successfully integrated into a remotely operated vehicle within a test tank facility, and its capabilities were demonstrated [48].



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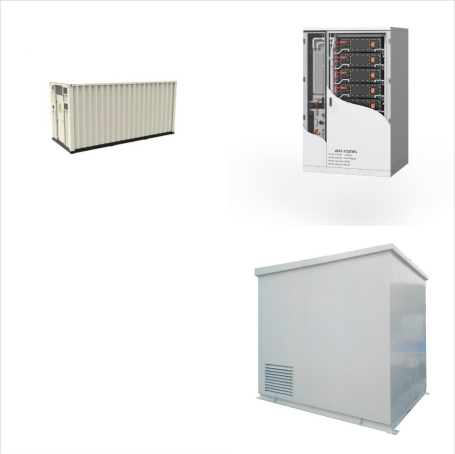
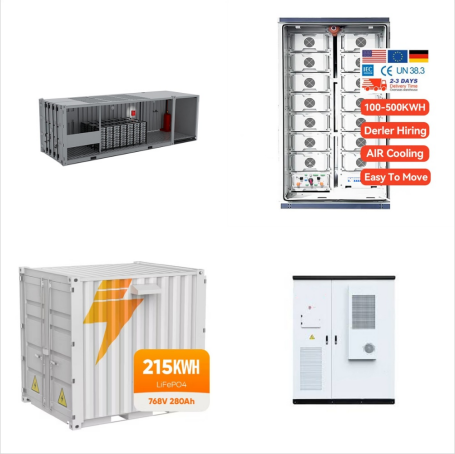
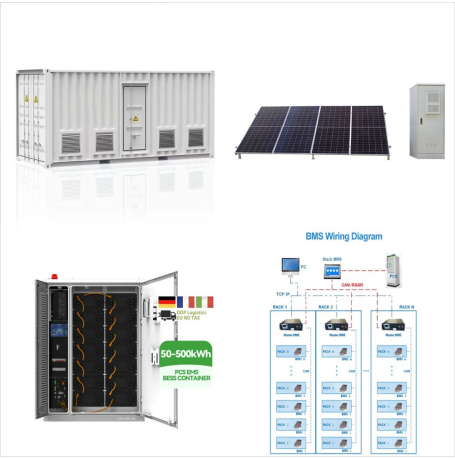
ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE



Underwater vehicles use hydrogen energy systems having Air Independent Propulsion (AIP) systems. Remotely Operated Vehicle (ROV) is an unmanned underwater vehicle with connecting cables, which depends on the mother ship and the operator on the boat. Fuel cell power systems for autonomous underwater vehicles: state of the art (Mar. 2014

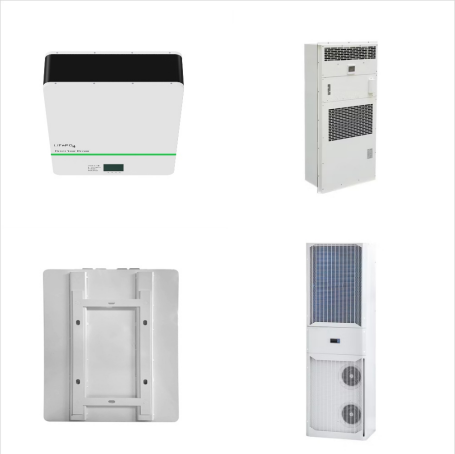


This paper provides a technology assessment for an unmanned underwater vehicle (UUV) fuel cell energy/power system (FCEPS), including design methodology and design concepts. The design concepts are based on the polymer electrolyte membrane fuel cell (FC) operating on hydrogen and oxygen. The technology assessment method presented is a ???

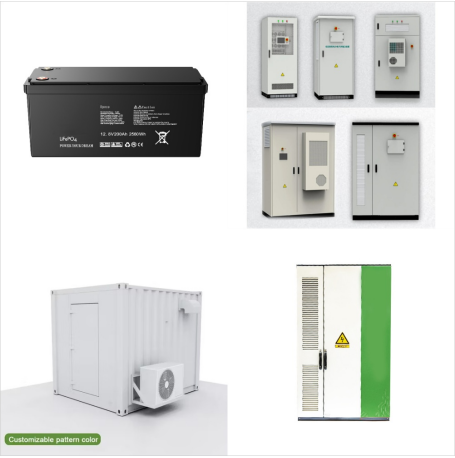


system to Power Remotely Operated Underwater Vehicle SAN DIEGO, Calif. ??? General Atomics Electromagnetic Systems (GA-EMS) announced today that it has successfully completed the first end-to-end demonstration of its Aluminum Power System (ALPS), powering an underwater remotely operated vehicle (ROV) at a GA-EMS test tank facility in San Diego.

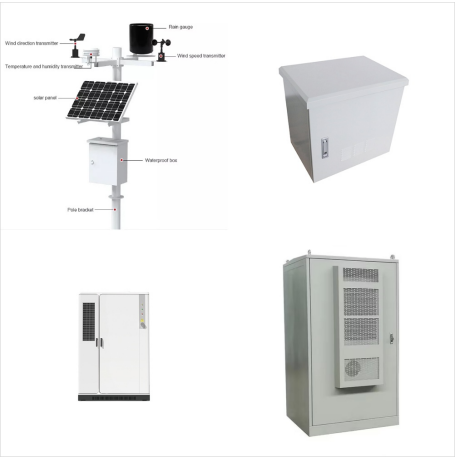
ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE



Fuel cells (FC) are expected to improve the endurance of unmanned undersea vehicles (UUVs). Hydrogen-oxygen fuel cells are commonly utilized undersea, which suffer from high cost and technical



The ARCS 1, a DND/DREP owned experimental unmanned submersible, has been chosen as the trial vessel. The FCPS will provide sufficient energy to allow the UUV to operate submerged, continuously for 30 hours which is approximately 4 to 6 times the endurance of its existing ???



(DOI: 10.1109/OCEANS.1993.326084) Alupower Canada Limited and the Department of National Defence with CRAD funding and DGMEM engineering support are designing and constructing a fuel cell power system (FCPS) to power small unmanned vehicles (UUVs). The ARCS 1, a DND/DREP owned experimental unmanned submersible, has been chosen as the trial vessel. ???

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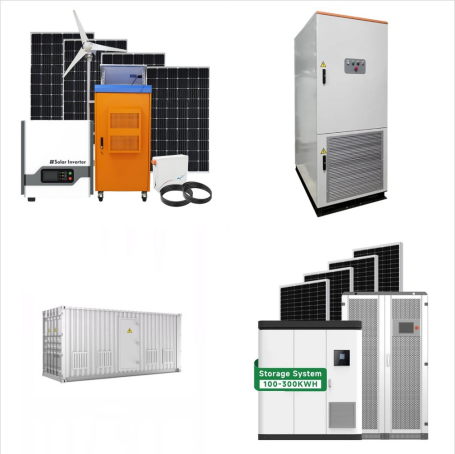
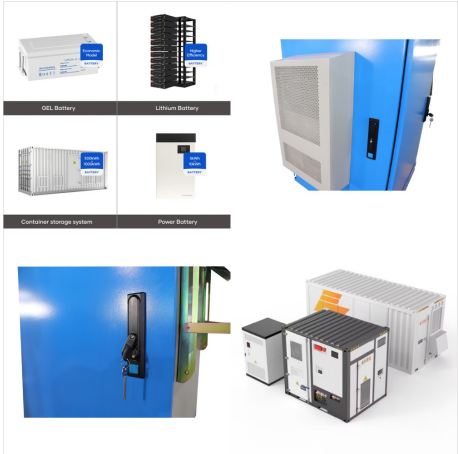
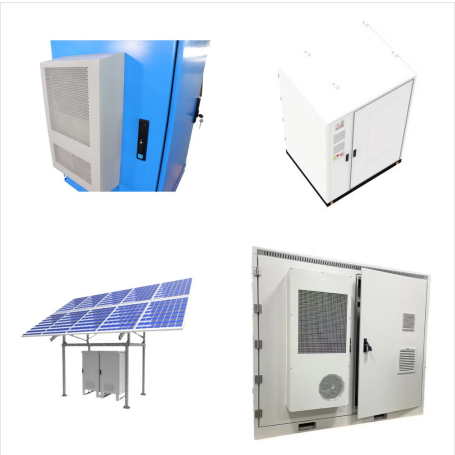


FFI has been developing autonomous underwater vehicles (AUV) for more than a decade. During this period we have been using many different power sources: magnesium/dissolved oxygen seawater semi-fuel cell [1], [2], valve-regulated lead???acid (VRLA), nickel/cadmium (NiCd), nickel/metal hydride (NiMH), alkaline aluminium/hydrogen peroxide ???

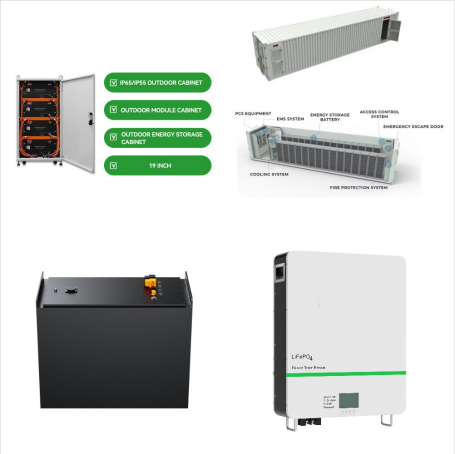


Aluminum is an attractive energy storage material for underwater propulsion because of its high density and strongly exothermic reaction with seawater. However, the degree to which an aluminum???seawater power system could outperform other systems has remained unknown because of uncertainties about volume and energy costs associated with the balance ???



Amongst metal???H 2 O 2 batteries, H 2 O 2 was first applied to aluminum???hydrogen peroxide (Al???H 2 O 2) batteries in 1969. 22 Al???H 2 O 2 cells were successfully used by the US and Navy as a power source for UUV HUGIN-II and HUGIN-3000. 23-26 However, the severe self-discharge of this type of battery limits its wide application.

ALUMINUM-HYDROGEN PEROXIDE POWER SYSTEM FOR AN UNMANNED UNDERWATER VEHICLE



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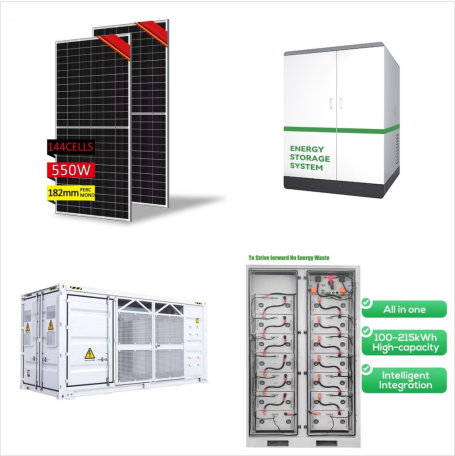

MIT has announced that its spinout company Open Water Power (OWP), recently acquired by major tech firm L3 Technologies, has developed a novel aluminum-water power system that will improve the range of unmanned underwater vehicles (UUVs).. The power systems could find a wide range of uses, including helping UUVs dive deeper, for longer ???