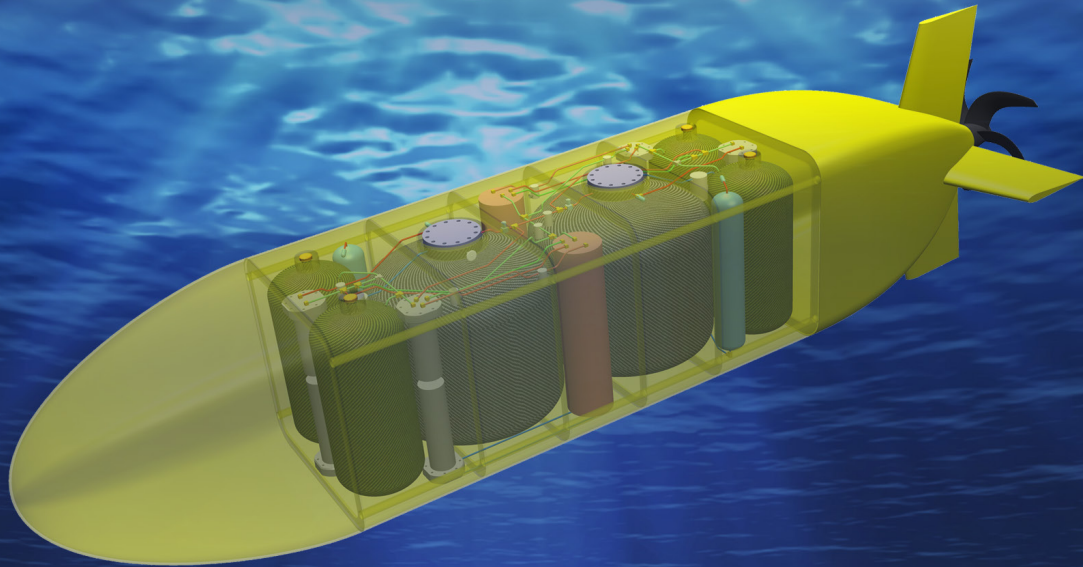


ALPS

ALUMINUM POWER SYSTEM



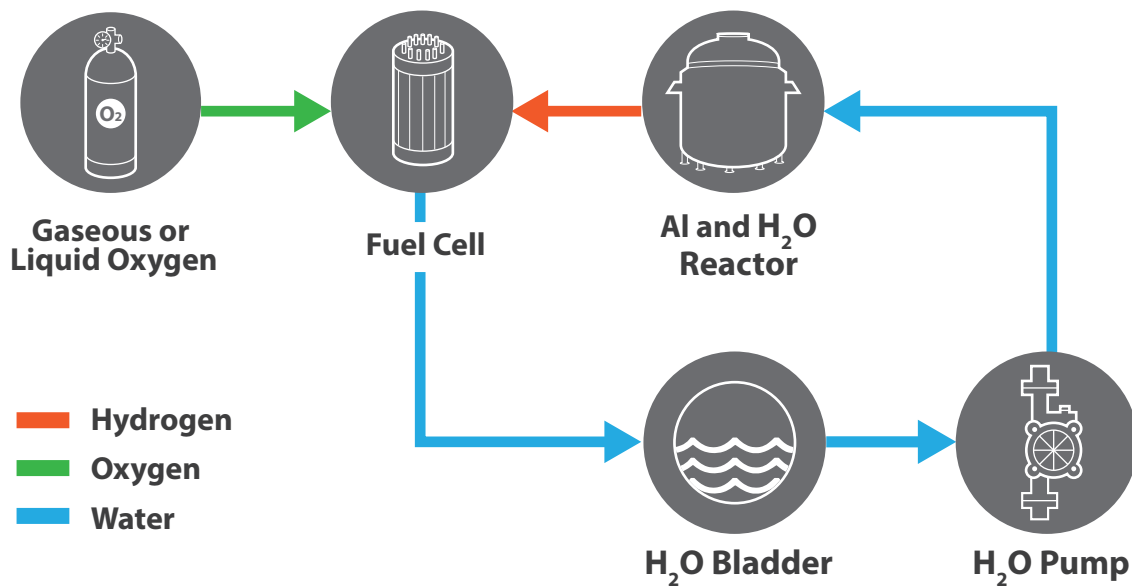
- Safe, reliable operation
- Increased energy density
- Stable, long shelf life
- Simple refueling process
- Modular, scalable

ALPS

General Atomics Electromagnetic Systems (GA-EMS) specializes in developing safe, reliable power and energy systems for extreme environments. The Aluminum Power System (ALPS) utilizes an aluminum alloy to provide an energy dense, cost efficient power source for manned and unmanned underwater vehicles.

Aluminum stores more energy per unit volume than any other viable non-nuclear source. ALPS generates pure hydrogen on demand, which is combined with oxygen in a fuel cell to produce power. Hydrogen is recycled via the aluminum water reactor and the fuel cell, providing a clean and efficient source of power. The system eliminates the need for storing large amounts of hydrogen, along with the associated safety concerns, to support long endurance missions. ALPS' simple system design and control scheme (load following) makes it a robust, reliable power source for underwater operations. With primarily passive components and control for quiet operation, ALPS is well suited for underwater stealth applications.

Under development for the Office of Naval Research, GA-EMS has successfully completed a 46-day autonomous demonstration of ALPS at Technology Readiness Level four (TRL-4). Additional testing and fabrication is underway to advance a full-scale TRL-6 system for integration into a Large Displacement Unmanned Underwater Vehicle (LDUUV).



Safe, clean, non-toxic