

Advancing Deep-sea Operations for Unmanned Vehicles



In October 2015 a consortium of UK companies and academic partners, led by Steatite, began an R&D project to develop a battery pack that will be pressure tolerant up to depths of 6,000 metres. The first phase of the project, recently completed at NOC in Southampton, involved repeatedly testing Lithium-Sulphur (Li-S) cells at pressures and temperatures equivalent to undersea depths of 6,000m. The test results have confirmed that the cell performance is unaffected by being exposed to these extreme conditions, with consistent delivery of energy.

Using the test facilities at the NOC, Li-S cells underwent multiple pressure, temperature and discharge cycles. Subsequent analysis showed that there were no adverse effects to the internal structure to the cell.

Summary of project milestone so far include:

- Repeated cycling of Lithium-Sulphur cells under conditions replicating a depth of 6,000m show consistent energy delivery performance
- No internal damage or adverse effects on the chemistry of the cells is detected
- Production of hardware and software for the associated battery management system is now underway.

Due for completion in October 2017, the project is looking to exploit the inherent benefits of Lithium-Sulphur battery technology. This presents advances for marine autonomous systems looking to improve on neutral buoyancy, higher levels of safety and higher energy densities, delivering greater speeds, endurance and payloads.

The project's aim is to build and demonstrate a Lithium-Sulphur system in the flooded compartment of an autonomous vehicle. The next phase of the project will complete the design work for a trial battery pack including a pressure-tolerant battery management system.