Application Notes: Low Temperature

In extreme low temperature environments, specialist equipment is required and the same goes for batteries. Here we show how research is conducted in the most inhospitable place on Earth.

Case Study Scientific Research in Antarctica

In order to take extremely accurate measurements of the atmosphere and environment, the British Antarctic Survey (BAS) need to place their sensors across the continent, well away from any base or generator that may create emissions that would affect the readings. This means that the stations are only powered by batteries which are recharged via solar power during the summer months. Wind generators cannot be used due the extreme conditions, as they are destroyed by the ice and very strong winds.

To travel these vast distances, BAS need to fly all of their equipment into position via a number of bunny hops with their transport planes. This is done because the aircraft range is shorter than a one way trip to each sensor station. In this situation, the weight of the batteries is critical, as the current batteries are twice the weight of the sensors and solar panels combined.

By using Li-S batteries, there is an opportunity to cut the weight of the batteries carried by 5, allowing significantly more scientific equipment to be carried on each flight, therefore improving and increasing the results gathered in the part of the world that can tell us the most about the Earth's climate.

A "standard" Li-S chemistry cell cannot be used though, as the temperatures drop to as low as -70°C and heating cannot be used due to the 6 month long winter without sunshine to power the solar panels. To get around this, OXIS is developing a chemistry that operates at these extremes without the need for heating, but can also operate at room temperature. This chemistry has been integrated into cells and been tested to ensure that they operate as required at these temperatures. These cells could be suitable for other applications which require light weight and extreme cold temperature operation.

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