The ChronicleHerald | Herald Business

Wednesday, June 24, 2015 INDEPENDENT SINCE 1824 ▪ V66 N149

Halifax 22/13 Sydney 18/11 Yarmouth 17/12

Metro Edition

thechronicleherald.ca

Ocean sensor up for $2-million prize

Satlantic helped create tool to gauge water's pH level, impact of carbon emissions

ANDREA GUNN

Measuring the pH balance of a substance has numerous applications, from health to food safety, but a piece of made-in-Halifax technology is taking the measurements to new depths — literally.

Satlantic, the Nova Scotia arm of Washington state ocean technology company Sea-Bird Scientific, is part of a team in the running for the $2-million Wendy Schmidt Ocean Health XPRIZE for an instrument that can measure the pH balance of salt water.

The SeaFET Ocean pH sensor was developed by researchers from the Monterey Bay Aquarium Research Institute and the Scripps Institution of Oceanography several years ago.

Engineers at the Satlantic Sea-Bird location in Halifax, which spun off from Dalhousie University research programs, developed the technology to make it commercially available.

Now it manufactures the SeaFET for use in hundreds of oceanographic endeavours worldwide.

There are plenty of ways to measure the pH balance of a substance, said Sea-Bird director of engineering Keith Brown. But what makes the SeaFET unique is its ability to accurately measure the pH of salt water and withstand the harsh ocean environment.

It uses an electric current to measure the pH balance through something called an ion-sensitive field-effect transistor sensor, originally developed by Honeywell and often used in food safety processes.

"A normal transistor uses a small voltage on its gate terminal to control the current going through the transistor," explained Brown.

"The ISFET uses the concentration of hydrogen ions to produce that small voltage by creating a current. We measure that current and that gives us a good measure of pH."

Geoff MacIntyre, director of marketing at Satlantic, said measuring ocean acidification is a major undertaking by scientists in oceanography in recent years and can be used to measure the impact of carbon emissions.

"(Ocean acidification) is related to the increase in carbon dioxide in the atmosphere," MacIntyre said.

"That increases with the industrial revolution, fossil fuel burning. It gets absorbed up into the surface water of the ocean and through the carbon cycle creates carbonic acid, so it makes the ocean more acidic."

Ronnie Van Dommelen, an engineer with Satlantic, said that since the Industrial Revolution, the world's oceans have seen decrease of 0.1 on the pH scale, indicating increasing acidity, and scientists expect a drop of 0.3 to 0.4 in the next 100 years.

Keith Brown, Satlantic Sea-Bird director of engineering development, left, and Ronnie Van Dommelen, research engineer, display a SeaFET Ocean pH sensor produced by the company. Satlantic is part of a team competing for a $2-million prize.

"It's very serious," Van Dommelen said.

Ocean acidification can have major implications for marine life, such as many types of micro-organisms and shellfish, as well as coral reefs. It can hinder calcium carbonate shell growth in certain forms of marine life, making them softer and and thinner, Van Dommelen said.

One of the practical applications of SeaFET technology is to monitor the pH of water around certain types of aquaculture.

"Some fish, like the clown fish, can't smell as well and can't find their direction," Van Dommelen said.

"(Ocean acidification) can have a tremendous impact on the ecology of the oceans; it will impact people's food sources."

Three versions of SeaFET are in the running as part of Team DuraFET, which includes Sea-Bird, Honeywell, the Monterey Bay Aquarium Research Institute and the Scripps Institution of Oceanography. There is the standard SeaFET and a version called the SeapHOx, which includes instruments to measure other conditions. A newly developed Deep-Sea DuraFET, which can measure pH at depths of 2,000 metres, is also in the running. The SeaFET and SeapHOx are finalists for the affordability prize, with a total award of $1,000,000, while the Deep-Sea DuraFET is up for the similarly valued accuracy award.

In order to be named finalists, the instruments had to undergo laboratory tests, tank testing and testing in salt water off Hawaii. Team DuraFET was named one of five finalists, with winners to be announced in July.

If it wins, Brown said, the team will donate the prize money to help equip ocean health research initiatives with SeaFET technology.