

LABORATORY

TECHNOLOGY

Gate Scientific raises a stir with sensing stirrer bar

During Pittcon 2019 in Philadelphia, PA in March, **Gate Scientific Inc** (Milpitas, CA) launched its wireless continuous pH and spin monitoring stirrer bar – the smartSENSE® stir bar – aiming to start a small revolution in the laboratory. This is the second of the company's stirrer bars that uses radio-frequency identification (RFID) to incorporate the sensing mechanism into the bar, the first product having been introduced a year ago with wireless temperature sensing capabilities.

The smartSENSE stir bars continuously relay data to a wireless chemical control station, which contains the integrated hotplate and stirrer function. Based on the real-time information from the stir bar, the control station will self-adjust the heat to maintain the temperature as specified and/or measure the pH, depending on the stirrer bar used. Using internet of things (IoT) capabilities, the setup can also be accessed remotely from a computer or smartphone for monitoring, control and data logging.

The precision hotplate stirrer will set customers back \$2,275, with temperature sensing stirrer bars, which have been sold since November, costing up to \$99 each. Spin sensing stir bars, at \$90 per item, started shipping in March, and the pH monitoring technology will be shipping by the end of the year, Morten Jensen, CEO of Gate Scientific, told *Instrument News*.

The fact that the company was able to win the Pittcon Today Excellence Award in Gold in the category for companies with annual revenues below \$10 million two years in a row indicates that the concept is convincing not only in bringing laboratory work into the 21st century, but also in its possible impact on the laboratory equipment market as a whole. Incorporating the standard electrochemical sensing mechanism into a stirrer bar seems a logical step, especially with wireless communications having become standard for over 20 years. But, so far, achieving it in a commercial product has remained elusive.

While the demand for such a product was there for some time, "until recently the technology has simply not been available to accomplish it", Dr Kris Scaboo, CTO of Gate Scientific, explained. "The wireless technology incorporated into the smartSENSE pH stir bar forms the basis for a revolutionary paradigm shift in our customers' ability to obtain tight thermal control and constant pH monitoring of any reaction, formulation, bioprocess or titration – even in a completely sealed environment", Scaboo added. As it stands, the smartSENSE can be used as a chemical reactor, and while industrial reactors are normally larger, this might be a path the company is pursuing.

Challenges included to build a self-charging wireless sensing system near

a strong magnet in the stirrer bar and a chem station that could heat and generate a magnetic field, Jensen explained. "Identifying ... compounds [that ensured] the chemical integrity of the stir bar was important – we couldn't use traditional encapsulation techniques as they would destroy the electronics in the stir bar," he said. The design of the bar needed to protect the electrochemical electrodes against impact damage and the electrochemical sensors use the latest polymerized electrolytes, so that they do not need maintenance. "All technologies were developed over three years at Gate with assistance from local scientists."

Primary markets for the technology, which may be expanded into dissolved oxygen and other ion-selective probes, include cell culture and bioreactors, the food and beverage industry, in addition to pharmaceutical and general chemistry laboratories.

The self-funded company was started in 2015 by Jensen and Scaboo, neither novices in the field of translating ideas into practical commercial products. Scaboo, with a background in electroanalytical chemistry, has led R&D work at Xanthon and NVS Technologies, while Jensen held leading roles on the product development at Abaxis and Caliper, pioneer of lab-on-a-chip technology, commercialised famously in Agilent's 2100 bioanalyzer instruments, launched in 2000. ■