University of Minnesota licenses sensor technology to a startup

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United Science, a Minnesota startup company, has licensed sensor technology developed at the University of Minnesota that could prevent toxic byproducts of mining and other industries from ending up in the environment and improve productivity at the same time.

Chemistry associate professor Philippe Buhlmann in the university's College of Science and Engineering developed the ion selective electrode (ISE) sensor membrane. United Science will complete the design and commercialize the membrane technology, which is already being tested in the mining industry.

ISE sensors are used to detect and measure a specific ion in complex chemical solutions used in mining, food safety and health sciences. Buhlmann's fluorous sensor membrane is longer lasting, more durable and has improved selectivity and less interference than other ISE sensor membranes. Unlike other membranes it does not contain glass, making it better suited for use in caustic, high-pressure environments such as mining, as well as applications in food safety where broken glass could pose a hazard.

"We're all about unique sensing solutions," said Jon Thompson, the CEO of United Science who received his doctorate in chemistry from the U of M. United Science, based in Center City, Minn., specializes in developing chemically selective materials. "What we're after is addressing tough analytical problems. To accomplish this, we customize our sensing platform to address unmet sensing needs."

"We can get thousands of times higher selectivities than with conventional sensors," said Buhlmann, a leading researcher on fluorous membrane technology. "They are more selective and more resistant to bio-fouling."

When used in mining, the ISE sensor can prevent toxic materials from funneling back into the environment through the waste stream. Miners often use hazardous chemical reagents to draw out valuable ores during the process, but often use more than necessary to ensure all the ore is extracted. The sensor allows miners to use less toxic chemicals, which results in less toxic material in the waste stream. According to United Science, if implemented industry-wide the sensors could eliminate at least 24 tons of toxic waste emissions per mine. While the company is currently focusing on copper mines, the technology may be extended to iron mines.

"In mining applications they can use exactly the necessary amount of chemical reagent. If you add too little, you're going to lose a lot of money, because you are not separating the metal out of the ore; if you're using too much, you're wasting money and the agent ends up in the environment," said Buhlmann. "This is a perfect marriage of being economically more viable and environmentally friendly."

Buhlmann's research was funded by the National Science Foundation (NSF) and the National Institutes of Health (NIH). Recently, Buhlmann and Thompson received Small Business Technology Transfer (STTR) grants from NSF to commercialize the technology.

Licensing this membrane technology has allowed United Science to serve a niche market -- in this case, mining -- where alternative sensing methods were absent. Beyond mining, Thompson said he plans to apply this technology to food safety, but wants to identify other areas where current sensors are inadequate or expensive.

"We were able to successfully apply the technology to some very challenging applications in the mining market. Other sensors that address challenges in other markets are under development," Thompson said. "Our market approach involves first identifying the need and value of a unique sensor; then we leverage the product platform."

Jay Schrankler, executive director of the University's Office for Technology Commercialization, said the licensing of this new technology is a win-win situation. "OTC is constantly on the lookout for commercialization partners like Jon Thompson whose market vision and leadership skills, combined with Dr. Buhlmann's technology innovation, lead to a solid business startup proposition."

Provided by University of Minnesota