

ASI TODAY

A newsletter for customers of Analytical Sensors & Instruments Ltd.

Fall 2008

From the GP's Desk



Peter Cai, GP & CFO

Dear Customers and Friends:

Fall 2008 is a historic milestone in my family's life. Twenty years ago, my wife, Yuxian, and our daughter, Lingyi (Jessica), came from China to join me in the U.S., after about five years being apart. Before my wife came to the U.S., she had 23 years of experience in pH sensing bulb glass blowing and electrode manufacturing. After our reunion, my wife and I tried very hard to find a job for her, but we were disappointed many times. We discussed and deliberated what to do in the future and how to build our life in the U.S. At the same time, we tried several unsuccessful business endeavors. Finally, in the Fall of 1989, we decided to start a small shop, i.e. ASI, to do what we enjoyed and excelled at - making electrodes. On the morning of Sept. 1, 1989, we walked into our newly leased shop building, which was a 1,500 sq. foot office/warehouse type building that was mostly not air conditioned. My wife and I looked around the empty space and then at each other, thinking with determination to start our new life from here.

Now, 19 hard-working years have passed and ASI has entered her 20th year in business. We have done our best to maintain our corporate culture and build an honest business in the best interest of our customers. In doing so, we have maintained quality, technical service and fair pricing. Because of our team efforts and our customers' support, we have grown from ground zero to a major OEM sensor supplier in North America. We started with two employees, my wife and I, an empty building, and no sales - now we have over 170 employees in four offices, occupying 40,000 sq. ft. space and with a revenue over 10 million dollars.

Looking back, we are very excited at our company's growth. Looking forward, we are full of determination to be the best OEM sensor supplier in North America. However, this determination requires strategic planning, wise execution and even more hard-working spirit. Recently, we restructured our company with two major changes - the establishment of

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ORP 101 - using mV potential to monitor a chemical process



Oxidation-reduction potential, or ORP, is a term used for the measurement of a chemical process that is undergoing an oxidation and/or reduction reaction. It is also commonly referred to as REDOX. Oxidation reactions are those that involve an atom losing an electron, and a Reducing reaction is one in which an atom gains an electron. As you can imagine, or recall from your last chemistry class, these two reactions go hand-in-hand and occur in the same chemical process. A chemical known as an "oxidizer" is good at "stealing" electrons from other substances - for example, typical water disinfectants (chlorine, bromine, ozone) are oxidizers because of their action on the chemistry of unwanted microorganisms and plant material. Or maybe, you can call those microorganisms strong reducing agents of halogen chemicals!

Either way you look at it, ORP reactions do create an electrical potential that can be measured with an ORP (aka REDOX) Electrode. As the reaction progresses, you can watch its progress with an ORP electrode as each atom that can be oxidized, is oxidized and each atom that can be reduced, is reduced. All the time, the ORP Electrode is delivering a mV output that may track up or down depending on the chemistry, and eventually will either equalize or change directions.

Common Applications Using ORP Electrodes

Wastewater Disinfection Status

One of the most common applications for an ORP Electrode, as stated earlier, is the monitoring of a water disinfection process. A wastewater plant operator adds chlorine to the water in one of the final process, to ensure that microorganisms are oxidized (destroyed). Within his analytical tool box, he has an ORP electrode hooked up to an analyzer that provides a mV display. Over time, the operators have trended the data on the treatment process to determine an ORP value that indicates the point at which when further addition of chlorine is no longer needed, since there is a sufficient amount present to consume the expected amount of microorganisms in solution.

Pool & Spa Monitoring (also a disinfection status)

Another very common application for an ORP Electrode, is the monitoring of a swimming pool and spa water disinfection process. Hotels and other large public swimming pools/spas typically have automated monitoring and chemical dosing systems. Oftentimes, these monitoring systems use an ORP electrode and pH electrode to maintain the chlorine, bromine or disinfection chemistries. Like the

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Perhaps you have some ideas on using an ORP Electrode in your process after reading the cover article of this newsletter. As it stated, ORP is an easy parameter to test and with some study of your process, a very useful parameter to monitor.

Even better, ORP Electrodes can be very low maintenance and are not calibrated. You might be wondering how a test system does not require calibration?

ORP Electrodes, when connected to a mV meter (i.e. a pH/mV Meter) deliver an absolute value. Like a pH sensor, they develop an electrical potential that is then compared to the reference wire potential. Unlike a pH electrode, their displayed output cannot be adjusted and since calibration is essentially a reference point adjustment, cannot be calibrated in the true sense of the word.

However, ORP electrodes do have a shelf life and are susceptible to fouling, aging and other phenomena that affect other sensors. To monitor the status of an ORP electrode and determine that it is still working properly there are solutions available that are known to deliver a specific ORP value with a properly functioning electrode:

Zobell's Solution: $\sim 228\text{mV} \pm 20\text{mV}$

Light's Solution: $\sim 450\text{mV} \pm 20\text{mV}$

pH 4 with Quinhydrone: $\sim 260\text{mV} \pm 20\text{mV}$

pH 7 with Quinhydrone: $\sim 90\text{mV} \pm 20\text{mV}$

It is important to note that the first two solutions (Zobell's and Light's) are known to be reasonably stable and are commercially available in bottles. The pH buffer solutions with saturated quinhydrone are not very stable and need to be mixed just prior to use. Also, they

need to be used within about 2 hours of mixing. ASI offers these solutions, including the buffer/quinhydrone for our customers and it is recommended that you check the ORP electrode response on a regular basis such as once a month - more often if you are testing frequently or in harsh conditions.

If your ORP Electrode is in good operating condition, it will deliver the mV value in the range listed here when placed in one of these solutions. If the electrode does not, check to make sure your electrode is prepared properly (connection to meter, fill solution, etc). If everything seems to be in order check the noble metal sensor of the electrode - if its surface seems dirty or fouled you could try cleaning it. We have an ORP cleaning solution available or you could use a mild acid solution and a cloth to wipe away the fouling or dirt. Like a Combination pH Electrode, a Combination ORP Electrode has a reference half cell integrated into the same body housing as the sensing half cell. Make sure you keep the reference junction hydrated and free from interferences - it accounts for most of the failures of an ORP electrode. This is easily done by using a storage solution (same as pH electrode). If you know you will be using the ORP Electrode in a solution containing sulfides or other chemicals that could attack the Ag/AgCl reference wire, you should consider a double junction reference system.

As always, contact ASI's technical support staff if you have any questions on ORP or other electrochemistry solutions.

NEW ASI Website
makes navigating and finding
useful electrochemistry
information even easier

Visit us at:
www.asi-sensors.com

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a New Business Development & Marketing Department and a change to the management of our Aurora operations.

In August, we formally transformed our Colorado office to our New Business Development & Marketing Department led by Steve Zelenak. Steve has been our VP of Engineering and under his leadership, ASI's engineering department has grown from infancy to a well-managed, mature group, contributing greatly to ASI's growth. Steve's new title is VP of New Business & Marketing. His Marketing Manager is Dave Ruane who joined ASI in 2007 as a Sales Engineer. Dave has many years of experience in the industry and is well positioned to lead the ASI marketing efforts. Of course, this group is also supported by our veteran VP - Dennis Finch. This group is focused on broadening our product offering and enhancing ASI's image in the global E-Chem industry.

Earlier this year, we also implemented management changes at Aurora - our branch in Shanghai. We expanded the management scope of our VP of Operations, Frank Zheng, to include Aurora management. Frank has been with ASI for over 14 years and is credited with the design and implementation of our efficient operations department. Frank has already driven a number of improvements at Aurora and we are confident he will bring Aurora to the same par as ASI, so that our customers can benefit from our manufacturing operations across the ocean.

ASI marches into our 20th year in business this Fall and we are confident we will move forward. We have built a loyal and dedicated team, and a customer clientele which is very loyal and supportive. We will rely on these two bases and continuously expand them to achieve our plan.

On September 13, Sugar Land, the location of our headquarters, and all of the Houston area experienced the worst hurricane in 25 years. The city was paralyzed for two days and I saw a lot of severe damage to homes and businesses. However, our building, employees and families were spared.

We praise our Lord for all His protection and continuous blessing.

Thank you all.

Peter Cai
GP and CFO



ASI Quality Control Department
(Top row: Sing, JoAnn, bottom row: Wendy, Mary, Pei, Shih)

ASI's Quality Control (QC) Department is a fast paced group dedicated to the quality of outbound production. Every electrode that ASI manufactures goes through this talented group of individuals to get inspected, tested and prepared for final packaging. They are very familiar with the design and operation of electrochemistry sensors and documenting test results. This department plays a critical role in all of ASI's manufacturing operations.

A short profile of this department includes:

JoAnn Tan - JoAnn manages the QC Department and is very knowledgeable on all of ASI's products. She started at ASI in November 1999 and enjoys gardening, reading and playing the electric organ.

Pei Wang - Pei started with ASI in October 1998. She resides in Houston with her husband and her parents are also local. Pei's daughter recently started working after getting her Masters Degree. While not busy at work, Pei enjoys fine dining, reading, music and travelling.

Mary Johnson - Mary joined ASI in June 1999 and enjoys working at ASI because of the people and appreciates the fact that even the company owner takes time to talk with her. Mary and her husband have been married for 30 years and enjoy doing things (camping, fishing, sports) with their two sons and grandchildren.

Wendy Ong - Wendy has been with ASI since July 2000. She has been married for 15 years and has a son that just started high school in the Houston area. Outside of work, she enjoys a good game of badminton, gardening, or watching Indian soaps with English subtitles!

Shih Yu Pi - Joined ASI in November 2007 and still enjoys learning new things from her colleagues here at ASI. When she is not at work, she enjoys travelling and other hobbies.

Sing Pi Jun - Sing is the QC Department's newest member having joined in April 2008. She likes music, artwork, and exercise when she is not spending time with her family.

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wastewater application, the pool & spa monitoring has determined what mV value delivered by the ORP electrode, in conjunction with a pH value, will indicate a good pool/spa chemistry. This will save them money by knowing when to stop adding more chemicals, as well as ensuring safety and comfort of swimmers.

Power Plant Feedwater Control

A final application overview covers reducing agent control at a power plant. Power plants that include iron or copper feedwater components must control dissolved oxygen to very low concentrations to minimize corrosion. This is usually accomplished with the use of a reducing agent or oxygen scavenger such as hydrazine. Since dissolved oxygen measurements are more difficult to make reliably in this application, an ORP measurement is a very easy and better indicator of oxygen scavenger performance. Once again, the targeted ORP value should be determined based on long-term operation where oxygen scavenger levels are optimized.

As you can see there are many ways in which an ORP Electrode can help you keep a careful watch on a chemical process. It offers a reliable, easily maintained, and easily applied monitoring system. It is also a very affordable test system since there are not any consumed reagents.

ASI offers ORP electrodes in an assortment of shapes, sizes and applications including laboratory models and industrial, or on-line models. Our sensors include different types of noble metals (Gold and Platinum are the most common) as well as a variety of shapes to accommodate application requirements.

Contact your ASI sales representative to discuss how an ORP electrode might be the perfect solution for your measurement challenges.



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RETURN SERVICE REQUESTED

From the President's Desk



Brian Williams
President & CEO

Dear Customers & Friends,

Hello from Forward Operating Base Sharana in South Central Afghanistan. Yes, that means that I moved locations in Afghanistan and I am no longer the Division Liaison Officer for my brigade. I did such a good job that they decided to

move me into project management for all the the new locations that will have to be built over the next year so that we will have somewhere to stick all of the new soldiers that are being sent to Afghanistan in the near future.

This means that I am already incredibly busy learning the in's and out's of construction here in Afghanistan. I have several pictures here that show some of the sites at my new location.

I continue to monitor and be updated on the happenings at ASI. I hope all of you had a great third quarter and an even better final quarter.

Have a good Fall and I will talk to you in the Winter!

Sincerely,

Brian D. Williams
CPT, EN
Forward Operating Base Sharana
Afghanistan

