

ASI TODAY

A newsletter for customers of Analytical Sensors & Instruments Ltd.

Winter 2004

From the President's Desk



Peter Cai, President

Dear Customers & Friends:

2004 has come to an end and we at ASI had a wonderful and successful year this past year. We find that our success as an OEM manufacturer in 2004 is a strong indication that our country is finally turning a financial corner for long-term improvement.

This past year at ASI, we not only added more employees with higher academic education levels to enhance our team's technical capabilities, but also we added more tools to our team. We equipped our machine shop with a new CNC lathe to increase our productivity and quality consistency. We have added WebEx capabilities to our company, so that we could have better communications with our customers. We also added more seats to our solid modeling software, Solid Works, so that our engineering groups at ASI and Aurora could use a standard tool for designing.

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Small World, Many Markets

A recent discussion with an ASI customer was a reminder of an earlier time, when life was at a bit of a slower pace for a time and when now grown kids were a lot younger. It also was a pleasant reminder of some of the cool things about working in our industry.

Years ago one of our engineers was on one of those Florida theme park rides that consist of little boats for children that float past various scenes inside a building while one of those songs that stick in your mind for days played in an endless loop. Dozing Dad was startled awake while drifting past an ASI produced pH sensor that was being used to monitor the water quality in tandem with a customer's controller. It was an early example of just one of the many unique situations in which we find our customers providing services using ASI sensors.

Most recently, the same engineer and now much older son were touring a very new, very leading edge teaching laboratory at a well known engineering centered university. In the physics lab on table after table were ASI produced sensors being used to help give budding scientists and engineers hands-on experience in the real world, collecting data during chemical and physical experiments. As our customer later commented:

"After all these years, I still get a little thrill out of seeing our stuff actually being used in a real classroom."

Of course, we typically see our products in other places, too. Some of the most important are also the very usual. We see them in water and wastewater plants all

across the USA, testing laboratories in the food and service industries, government labs of all kinds and many others.

Then again there are the sterilizable probes in process lines in those plants making our favorite malt beverages (breweries), some in the tech's pickup truck when he or she is monitoring acid rain runoff in the rivers, lakes and streams (and many others), more in the local hotels and municipal pools and spas. Down well monitoring is continually growing all around the US as well.

And then we can't forget that ASI and our sister company Aurora are increasingly becoming a contender on the international stage. How about the methane plant in Africa designed and supported by engineering students in Colorado, the probes used in the Australian outback and the Canadian bush? Power and water plants in the U.K. and other parts of Europe depend on ASI sensors to monitor their operations. Educational programs in Israel and Arabian countries in the Mid-East have been purchasing ASI probes in ever increasing numbers.

Finally, applications for our sensors are being added monthly in places like Shanghai, Beijing, and Hongzhou, China. Japan and Korea are also pages in the ASI portfolio. Why not though? Like the song at the theme park said "it's a small world after all, it's a small world after all, it's a small, small....."



**Chemical characterization laboratory
in Shanghai, China.**



Analytical Sensors & Instruments Ltd.

Measuring Your Success™



Hello all, my assistant TT Han and I have been very busy in the lab. I thought I would share with you some of the issues we have been working on. When I arrived at ASI one of the more pressing issues was the response characteristics of our pH glass. The Type VIII glass showed some issues of slightly lower slope and slower response time. We decided to attack this issue using a two-phase response. We initially instituted a quality control step to measure each crucible of glass we make and then we reviewed and strengthened our quality systems for glass production. But first we had to review how pH sensing glass was made.

The pH sensing glass is made from a formulary, which is an ASI trade secret, and the individual chemicals are weighed and mixed in the proper amounts using very precise scales. The chemicals are melted together in a very hot furnace in a platinum crucible until they are glass. The glass is then blown onto a stem of non-pH sensing glass until a desired shape, thickness, and diameter is obtained. When cooled the internal filling solution (another ASI trade secret) and a silver wire coated with silver chloride are sealed into the stem. These stems are then assembled into the various types of pH probes we sell.

The quality control step instituted for each crucible of glass we make was that I test six representative samples of the stems, thirteen (13) times in eleven (11) different

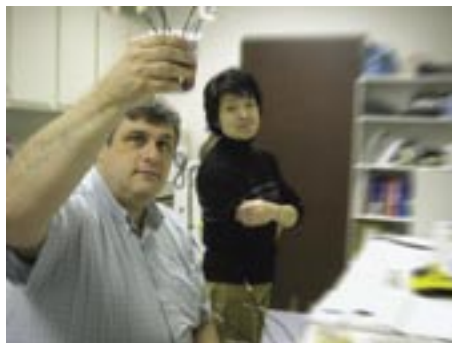
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Interesting note:

pH sensing glass and the internal filling solutions (IFS) for pH stems are considered trade secrets by all OEM electrode and sensor manufacturers. The research and development costs of creating a pH sensing glass formulary and IFS are equivalent in some respects to that of pharmaceutical drug design.

solutions in order to determine the slope, dynamic range, sodium interference, impedance, and ability to measure in low ionic strength solutions. If the test stems pass all tests then I allow the crucible to be used for production. If any test fails then I reject the crucible and the glass inside is destroyed and thrown away.

The quality systems we instituted employed "Good Manufacturing Practices" procedures I learned from the medical device industry and applied to the pH sensing glass manufacture. The combination of both of these new practices



Dr. George Barone & Amy Zheng (R&D)

has lead to dramatic improvements in our Type VIII glass. We have also applied these techniques to all of our glass types.

A test of six stems from a recent crucible of Type VIII glass had a slope of 58.1 ± 0.0 mV/decade (98.3% of theoretical), a pH = 0 intercept of 411.4 ± 0.7 mV, and a pH = 7 offset of -4.4 ± 0.6 mV. The stems recovered the pH = 0, 12, 13, and 14 solutions at 0.1, 11.9, 12.9, and 13.7 pH units respectively, all at ± 0.0 pH units. The stems also recovered a low ionic strength acid value in an average of 35 seconds. The bulbs had an average impedance of 53.3 MΩ. These analytical figures of merit for Type VIII glass are considered acceptable by ASI.

We at ASI are committed to bringing you the best performing probes we can and we are willing and often go that extra mile to ensure high quality standards in all of our products. TT and I spend many hours a day in the lab testing, analyzing, and improving our products so you can be assured of purchasing a quality product at a reasonable cost.

If you have any questions about our study, you can contact Dr. George Barone at gbarone@asi-sensors.com.

people propHiles

This month, we will profile our research and development technician Amy Zheng. Many of you may recognize the last name as being the same as our director of operations, Frank Zheng.

Amy has served ASI for over eleven years in various positions. She started out as a solutions chemist, manufacturing all ASI solutions from buffers to internal filling solutions. Over the course of eleven years, Amy has also worked every manufacturing position that ASI has, including soldering, assembly, testing and quality control.

Today, Amy is a key part of the ASI research and development team under the engineering department. She is the main force behind the scenes building new products, writing assembly instructions, designing some parts of electrodes in solid works and other various jobs.

Amy is also in charge of the ASI part numbering system, engineering price request ion system and our engineering change order system.

Amy and Frank have one daughter, who is currently a junior at the University of Texas at Austin, where she is a double major in Biochemistry and Chinese.



Amy Zheng
Research & Development



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From the President's Desk

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At Aurora, we have added additional molding equipment and more machinery to our machine shop. Our staff at Aurora has also increased, as we have added a new mechanical engineer, a new production engineer, a quality control technician and an electronic engineer to our team to increase the design capabilities and to better control our production quality and processes.

We are excited about 2005, and we hope that our new capabilities will better support your needs. Thank you all very much and I wish you all a Happy New Year.

May the Lord bless all of you.

Peter Cai

Peter Cai
President

Smart Sensors Are Catching On!

It has been a long time in the coming, but it looks like smart sensor technology is ready to take up some of the slack that technicians have been asking for over the years.

Analytical measurements are essential across the entire world - in labs, out in the field and in plants to control, monitor and give valuable information to users. Precise and reliable measurement and control of pH, ORP, conductivity, dissolved oxygen, potassium, ammonium/ammonia, sodium and other variables will benefit operations everywhere in many ways:

- Consistent product quality
- Improved process efficiency
- Reduced equipment maintenance
- Employee safety
- Compliance with environmental standards

New architecture combines the sensors and electronics into a single easy to use device. Calibrations, histories and other important data are more frequently being stored at the sensor, and not in the measuring device.

ASI is continuously working with OEMs over the last three years on these intelligent sensor designs and have experienced how effective the solution can be for the enduser.

Call us today to find out how we can help your company bring "smart sensors" to your market.

Probing For Success



In 1906, Cremer discovered that the electrical potential developed across a glass membrane was proportional to the pH difference across the membrane. In 1925, Kerridge developed the first glass electrode for analysis of blood samples. It was not until Beckman developed the first pH meter that pH measurements became widespread.

The state-of-the-art regarding glass pH electrodes has not changed dramatically in recent years. Most current pH electrode manufacturers either developed their pH glass formularies or purchased companies with existing glass formularies. And while pH electrode manufacturing techniques and processes have improved considerably, pH glass formularies have remained for the most part, unchanged.

Here in the United States, many of the modern pH glass formularies were commercialized by either Beckman or Corning with additional formularies developed in Europe finding their way here as well.

However, pH electrode improvements have not languished. More recently, Ross improved pH and reference electrode performance by developing a unique system that reduces the temperature effects of both the measuring and reference half-cell. Hach developed an innovative system to refresh the reference half-cell liquid junction when measuring difficult samples. Vernier designed pH electrodes with A-D amplifiers built into the electrode, making the electrode easier to use and immune to the noise associated with the high-impedance pH half-cell.

Here at ASI, we have followed a slightly different course. Peter Cai, ASI's founder, developed unique pH glass formularies during his early years of study and research in Mainland China. These formularies were commercialized when Mr. Cai founded ASI in 1989.

Today, ASI possesses 5 commercially viable pH glass formularies, all with uniquely different performance characteristics.

For performance details of these ASI pH glass formularies, please visit the ASI website.

Possessing this array of pH glass formularies allows ASI to customize pH cells for most any application or performance requirement.



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PITTCON 2005, Here We Come!

As you can see from above, ASI is gearing up for the 2005 PITTCON experience, and what a fantastic show we have planned this year. In 2005, ASI is launching several new products at the PITTCON show, to include our new Universal MicroStirrer™, the four electrode stand, the ASI stirrer, the new ASI electrode cap design and a variety of new electrode designs.

ASI is releasing these new products at the 2005 PITTCON show as a representation of our capabilities in research, design, tooling, molding and quality production. It has been our mission to improve ASI continuously, as we feel it is our responsibility to remain at the forefront of technology to support our ever-growing customer base.

We look forward to seeing you there!

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