



Medical In-Vitro & In-Vivo Electrochemical Sensors and Electrodes for Blood and Urine Analytes Determination

Measurements Currently Available for In-Vitro Analysis of Blood, Serum, Plasma and Urine

Common Ion Measurements:

Potassium (K⁺), Sodium (Na⁺), Lithium (Li⁺),
Calcium (Ca⁺⁺), Magnesium (Mg⁺⁺), Chloride
(Cl⁻), Hydronium (pH)

*Other ion or analyte measurements can be
developed upon request*

Blood Gas:

Oxygen (O₂), Carbon Dioxide (CO₂),
Hydronium (pH),
Ammonia/Ammonium (NH₃/NH₄⁺)

*Other blood gas measurements may also be
available or can be developed upon request*

Measurements for many of the listed analytes may also be developed for in-vivo as well as in-vitro applications

Previous Medical Developments

- Micro Ion Selective Electrodes for Sodium, Potassium and Calcium
- Replacement pH, Oxygen and Carbon Dioxide Electrodes for Corning and IL Blood Gas Analyzers
- Disposable Open Heart Surgery Electrodes and Cartridges for Oxygen, Carbon Dioxide, pH, Potassium and Sodium
- Disconnect and Disposable Transcutaneous Sensors for Oxygen and Carbon Dioxide

Technologies & Capabilities for Medical Sensors

- Over 20 years of experience in glass fabrication and design
- pH glass formulations for miniature medical electrodes formulations for stability proven up to 2 years
- Solid-State Ion Selective Electrode & Sensor Technologies (both standard and miniaturized) optimized for stability and accuracy required for point of care medical measurements
- Solid-State Reference Electrode Technology for reproducible and low-error measurements with a wide-range of measuring electrodes and sensors
- Gas Sensor Technology for carbon dioxide (CO₂) and oxygen (O₂)



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- Sealing and Reagent technology that completely avoids the need for ANY "O"-ring technology for maximum lifetime, accuracy and stability
 - Experience in Robotics Technology for mass production of sensors
 - Flexible and Dedicated Automation Technology to accommodate a variety of OEM customers needs
 - Electrode and Sensor Assembly Technology proven for any scale from prototypes to 100,000 per year.
 - Excellent Low-Cost and Low-Noise Operational CMOS Amplifier (Preamplifiers) to support high impedance sensor input up to 10 GigaOhms with minimal signal distortion and static sensitivity

A Short Curriculum Vitae (CV) of ASTI's Founder Martin J. Patko

Martin Patko was born in Hungary and graduated from the University of Technology at Budapest in 1963 with a Masters Degree in Chemistry, specializing in Macromolecular Technology and Physical Chemistry. His diploma thesis was: Gamma Ray Initiated Solid State Polymerization. Mr. Patko initially engaged in new product developments at the Hungaria Rubber and Plastics Factory. He later joined the privately owned Radiochemical and Electrochemical Corporation (Radelkis) in Budapest, working on all aspects of electrochemical technologies: potentiometry, conductivity, coulombmetry and polarography. His duties included areas from quality control, manufacturing, to new product development. He later served as Manager of Sensor Research and Development with 7 technical employees reporting to him. He participated in the development of pH and Ion Selective Electrodes for analytical applications as well as medical ion and blood gas analysis instrumentation. He participated in the establishment of new polarographic measurements and coulombmetric analysis. Mr. Patko was awarded 12 international patents. He served as a member of the Board of Directors from 1973 to 1977. In this position he was part of a team negotiating the formation of the first US-Hungarian joint venture of Radelkis and Corning Medical of Medfield, Massachusetts, named Radelcor. He later also served as Technical Liaison on blood gas analyzer technologies for the joint venture.

Mr. Patko immigrated to the United States in the Fall of 1977. His first position was with Beckman Instruments, Inc. as Chief Engineer in the Scientific Instruments Division with a staff of 13 engineers and technicians. He held this position from 1978 to 1982, heading several important new product developments in the field of electrochemical instrumentation, novel laboratory pH and Ion Selective Electrodes and was awarded a key patent. He was member of the management team to develop the industry's first microprocessor controlled pH meter family. During this time a semiconductor based pH electrode was also developed. An additional responsibility was to implement production of pH electrodes in Puerto Rico.

After the merger of Beckman Instruments, Inc. with Smith-Kline, Inc. in 1982 Mr. Patko founded Iotron Ltd. a Limited partnership dedicated to develop and commercialize new ion selective electrode and sensor technologies. He also formed and managed Iotron Inc. which was designed as a vehicle to transmit the ion selective technologies to industry in new products and developments. In 1986 he started and managed Advanced pH Technology, Inc. which extended the companies' capabilities into pH measurements employing 17 people.



Through these companies, he has developed innovative new products for both medical and industrial applications, including gas sensors, unique pH and ion selective electrodes and sensors. The latest addition to these companies is Advanced Sensor Technologies formed in 1996 for the development of industrial process control sensors, including exclusive, proprietary processes, which enable these sensors to serve in the most difficult applications in the industry. These new products gained major applications in the mining industries and are exported into the world market. During the 80's and early 90's besides managing his own companies as president and CEO, Mr. Patko performed contract developments for a number of companies, including ion and blood gas analysis equipment for open heart surgery for Bard Cardiosurgery Inc. He headed a development team comprised of 5 engineers responsible to create their gamma ray sterilizable pH, Oxygen and Carbon Dioxide Electrode system. At Critichem, a Becton-Dickinson Company, he assisted the company in establishing the utilization of disposable microelectrodes in their extracorporeal measurement devices. Mr. Patko contracted the development of disposable transcutaneous blood gas sensors for SensorMedics Corporation and his companies produced the components for these applications over 15 years. He also developed micro ion selective and pH electrodes for bench top blood, serum and plasma testing equipment for Applied Medical Technologies, Inc. and Sequoia-Turner Corporation. He assisted in revamping the pH electrode technologies for laboratory electrodes for Broadley-James Corporation and Fisher Scientific, resulting in significant increase in productivity and product quality.

In 1987, under a development contract to International Cardiovascular Medicine, Inc. a Porton International PLC (London) company, Mr. Patko developed the world's first precalibrated, disposable ion selective electrode for the measurement of potassium in a drop of blood. The product which ultimately embodied this technology, trade marked Stat K, was FDA approved as a 510K application in 1993. A US Patent was issued to Mr. Patko titled: Precalibrated Disposable Electrochemical Devices. Applications for same have been filed in more than two dozen countries.

In the near past through the facilities of StatChem, Inc. Mr. Patko was engaged as senior executive vice president of engineering in the development of POC instrumentation utilizing precalibrated disposable sensors for the in vitro measurement of ionic species, blood gases, hemoglobin and hematocrit in bodily fluids.

The first product, an In Vitro Potassium Test System, called STAT K has been cleared by the FDA in October of 2004. Mr. Patko also set up low volume manufacture with a contract manufacturer and headed a team to comply with all aspects of FDA and FDB regulations.

This document only describes a partial list of technical capabilities at Advanced Sensor Technologies to serve your medical sensor needs. Please contact the factory for further assistance and to begin your inquiry.