

# Introducing...epsilon™

Craig S. Bruntlett, Ph.D.  
Bioanalytical Systems, Inc.  
2701 Kent Avenue  
West Lafayette, IN  
47906-1382

craig@bioanalytical.com

*A highly-interactive approach to chemical analysis has been developed by BAS through the introduction of an instrument platform named epsilon. Experiments can be both monitored and controlled from any remote location with Internet access. Such worldwide connectivity enables global research collaborations, as well as the ability to select, purchase and take delivery of new analytical methods whenever they are needed. The epsilon-enabled instruments join the needs of the research laboratory with the convenience of e-business.*

In this issue of Current Separations, there have been several articles which refer to the use of a BAS epsilon instrument. What is epsilon?

The epsilon is an instrument platform made possible by the convergence of electrochemistry, chromatography, and e-business. The heart of epsilon is a system for solution-phase analytical chemistry. It consists of an interface and computer buss structure enabling the personal computer to seamlessly access the world of analytical instrumentation. Providing both control and data acquisition, the epsilon platform also provides the means to upgrade functionality via Internet access. The epsilon is NOT a single product. Instead, it is a family of products sharing a common basis for communication with each other, with a personal computer, with BAS technical centers worldwide, and with the Internet. It can encompass a variety of software modules and a

number of auxiliary components. The latter include processor-based high pressure pumps, syringe pumps, autosamplers, fraction collectors, temperature controllers, electrochemical cells, and other devices used in both liquid chromatography and electroanalytical chemistry.

Among the familiar analytical techniques made possible by epsilon are: voltammetry; liquid chromatography; titrations; and potentiometric, amperometric or galvanostatic sensors. The extent of analytical techniques made possible by the epsilon is not yet known! The lists provided in **T1** and **T2** represent only what we now offer or have in development. As a development platform, epsilon provides limitless possibilities for further product development. For example, custom instruments for companies or laboratories which have unique applications or instrumentation requirements are now

much more feasible within the epsilon concept. Such customized epsilon devices can be fabricated under contract.

The epsilon experience begins by defining a chemical measurement problem. From there, a selection of hardware and software options can be chosen from the epsilon web site in consultation with BAS scientists. For example, a researcher who needs an electrochemical detector for a chromatographic determination of macrocyclic antibiotics, 8-hydroxyguanosine, or a thiol-containing peptide, would begin by expressing that need to BAS via the epsilon web site, email, or a telephone call. A dialog would ensue to further define the problem and its solution, including a list of the instrumentation and accessories needed to accomplish the goals defined by the researcher. Another example, from the perspective of electroanalysis, is the educa-

tor who also conducts research and needs a flexible instrument performing a variety of techniques. The epsilon organization would enable this person to measure the potential of an ion-selective electrode, generate a cyclic voltammogram, develop a titrimetric method using dual, polarized electrodes, and also monitor the long term response from a collection of amperometric biosensors. Once the basic package was purchased, additional software modules enabling such disparate techniques could be

purchased via the Internet according to the dictates of funding, or priorities.

The user of epsilon products works with our proprietary "expert" software within the familiar Windows PC framework. An experiment begins with a brief interview of the user by the software to define conditions. Then, the optimal experimental configuration is suggested by the software. Upon acceptance by the user, instruments are then controlled and data is acquired, processed, and displayed. Although the epsilon software represents more than a century of accumulated analytical experience, this knowledge base is not static. It will remain as advanced as evolving developments in personal computing will allow. The interactive nature of epsilon instruments provides other opportunities. Web-based research collaborations, sharing of educational materials, online demonstrations, remote access and data processing (from home...or farther), and rapid data exchange from contract research groups to clients are among the possibilities available to epsilon users now. Service engineers can log into a remote epsilon and diagnose a problem or verify correct operation without setting foot in the laboratory.

Learn more about the epsilon concept and the range of instruments available by visiting the web site devoted to this product line at [www.epsilon-web.net](http://www.epsilon-web.net).

**T1**

*Epsilon-enabled Electrochemical Techniques*

- Cyclic and Linear Sweep Voltammetry
- Chronoamperometry and Chronocoulometry
- DC Amperometry
- Bulk Electrolysis (controlled potential or current)
- Chronopotentiometry (open circuit or controlled current)
- Differential Pulse Voltammetry/Polarography/Stripping Voltammetry
- Normal Pulse Voltammetry/Polarography
- Staircase Voltammetry/(TAST) Polarography
- Square Wave Voltammetry/Polarography/Stripping Voltammetry
- Potentiometry
- Potentiometric Stripping Analysis
- Conductivity
- Bipotentiostat
- Quad-potentiostat
- Galvanostatic Methods, Pulse and Step
- Auxiliary Control and Response, e.g. coupling with a spectrophotometer, or controlling a titration

**T2**

*Epsilon-enabled Liquid Chromatography*

- Electrochemical Detectors: Amperometric, DC, or PAD (Pulsed Amperometric Detector)
- Your choice from one to four detector channels
- ChromGraph-e Control, Data Acquisition and Data Analysis Package

**F1**

*The Greek symbol epsilon was adopted to represent the union of several faculties beginning with the letter e which merge into one concept. These included e-mail, e-commerce, electrochemistry, enabling, and experiment. The application of the epsilon platform currently includes techniques as diverse as liquid chromatography, electrochemistry, simulation, and in vivo sampling, but the potential exists for even more.*

