

VIASPACE

VIASENSOR BA-1000 Battery Electrode Health Analyzer

Li-ion battery technology has rapidly become the standard portable power source in a broad array of markets. While battery performance continues to improve, Li-ion batteries are being applied to an increasingly diverse range of applications, including consumer electronics, military electronics, medical equipment, aircraft, and satellites.

To meet the needs of higher capacity, increased charging rate, lower cost, and improved safety, researchers and manufacturers require a better understanding of Li-ion battery electrochemical and thermodynamic characteristics.

Until now, little has been known about the thermodynamic behavior of Li-ion intercalation materials during battery cycling. Thermodynamic measurements produce values for entropy and enthalpy. These properties, which are not easily measured by any other means, provide valuable insight to the structural changes related to lithium intercalation. Furthermore, the total heat of reaction of the battery material can be determined - critical information for battery safety to help prevent (thermal runaway). This information is important to researchers developing improved electrode materials and by manufacturers requiring accurate, reliable quality control and assurance of batteries

The VIASENSOR Battery Electrode Health Analyzer (BA-1000) is the first instrument of its kind that can measure entropy and enthalpy in an electrochemical cell. The VIASENSOR BA-1000 is based on the Electro Thermal Measurement System (ETMS) invented by Dr. Rachid Yazami and his team of Caltech and CNRS, Grenoble France.

The BA-1000 is designed to study Li-ion and other battery chemistries in small form factors such as coin cells or small laminated sheet type cells. Future models will incorporate other battery form factors and sizes.



The VIASENSOR BA-1000 Battery Analyzer is:

- A revolutionary and innovative new technique for measuring entropy and enthalpy of intercalation in batteries and in half cells at any state of charge.
- Based on patent pending technology invented by leading researchers at California Institute of Technology in Pasadena, CA, and CNRS in Grenoble, France, and licensed to VIASPACE
- Powerful, simple and straightforward to use and operate. The BA-1000 is an accurate alternative to other sometimes difficult and expensive techniques such as X-ray diffraction, neutron diffraction and calorimetry. The BA-1000, with its very small footprint will save much needed laboratory space, technique-specific expertise, and money.
- A non-destructive high resolution technique preserving the battery sample and providing precise information.

How does the BA-1000 Battery Analyzer work?

The voltage of a half-cell or a battery at rest, known as open circuit voltage (OCV), is measured as a function of temperature. The equilibrium open-circuit voltage is the difference in chemical potential of lithium atoms in the anode and in the cathode. By making measurements at different temperatures, the enthalpy and entropy contributions to the free energy of intercalation can be determined independently as functions of the lithium concentration.

The BA-1000:

- Tests up to four cells simultaneously.
- Has up to 1A charge/discharge capability.
- Covers a temperature range from 0C to 40C.
- Is complete with easy to use application software designed to ensure reliable data acquisition and to provide a powerful data analysis tool.

Benefits of the BA-1000

BA-1000 Enables Researchers to Measure and Quantify the Following...	Leading to Better and Safer Battery Designs and Improved Quality Control in Manufacturing
Discover invaluable insight about the structural changes in the electrode materials as a function of battery life or state of charge	Uniquely identify a fingerprint of any electrode materials, which correlates with its performances in a battery: <ul style="list-style-type: none"> • cycle life, • discharge capacity, • power density thermal stability, • etc.
Determine accurately the phase diagram of an electrode material as a function of lithium concentration	
Determine the degree of graphitization of an electrode material	
Differentiate between stoichiometric and non-stoichiometric electrode materials	
Discover the existence of macroscopic compositional inhomogeneities in the electrode materials and determine the pathway of intercalation during battery charge and discharge	

Who should be interested in the BA-1000 Battery Analyzer?

- Fundamental battery researchers
- R&D labs of battery companies
- Battery manufacturing companies

