



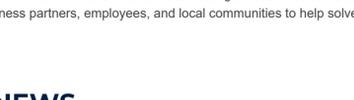
橋 THE BRIDGE

MATERIALS ANALYSIS eNEWSLETTER

SEPTEMBER 2022, ISSUE 111

WELCOME

When I hear the word "battery," the image that comes to mind features the disposable AAA, AA, C and D cells used in handheld games and toys—the ones that were "not included" with the gadgets. That probably says something about my age. These days, sophisticated batteries are used to power everything from our cell phones to implanted medical devices to electric cars...and more. Ensuring long life and the ability to maintain a full charge for years of operation is a major focus of battery research, and Rigaku products can assist in those studies. The battery attachment available for the SmartLab multipurpose X-ray diffractometer, for example, allows the changing structure of a battery to be studied during charge/discharge cycles, as reported in [this Rigaku Journal article](#). X-ray computed tomography instruments like the CT Lab HX can "see" inside a battery to detect defects or structural changes nondestructively.



Earlier this month, Rigaku announced a new tagline, "Powering New Perspectives." In the words of President and CEO Toshiyuki Ikeda, "As a company specializing in X-ray analytics, it has always been our company's mission to help our customers to see things that cannot be seen or visualized with more conventional techniques." Rigaku continues to work to implement a new company vision emphasizing its commitment to create innovative technologies and to work tirelessly with customers, shareholders, business partners, employees, and local communities to help solve global-scale problems.

IN THE NEWS

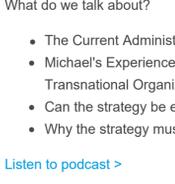
September 23, 2022: Passage of the Inflation Reduction Act of 2022 has resulted in [numerous battery manufacturers announcing plans to begin production](#) in the United States, supporting the transition to clean energy as well as clean transportation.

September 24, 2022: MIT engineers have created [a new low-cost battery for storage of renewable energy sources](#) made from inexpensive and abundant materials. Less expensive than lithium-ion battery technology, the new architecture uses aluminum and sulfur as its two electrode materials with a molten salt electrolyte in between. The smaller scale of the aluminum-sulfur batteries would also make them practical for uses such as electric vehicle charging stations.

September 26, 2022: Researchers in the US have constructed [batteries that can be completely absorbed by the environment](#) or living organisms after they have worked for a short amount of time. The batteries could be developed to power temporary cardiac pacemakers or for environmental monitoring.

September 27, 2022: Nitriles—organic compounds with a carbon atom triple-bonded to a nitrogen atom—are commonly added to the electrolyte formula for batteries using a lithium cobalt oxide cathode, making such batteries come much closer to realizing their full theoretical performance. Until now, battery researchers have not really understood why these nitriles work in this way. But a group of electrochemists have [used advanced microscopy techniques to take a closer look at what happens at the molecular scale](#) and identified what is going on, opening up new avenues for even further battery performance improvements.

Podcast



THE OPIOID MATRIX

Taking a Hard Look at the U.S. National Drug Control Strategy

Michael Brown
Counter-Narcotics Interdiction Consultant and Business Development
Rigaku

Taking a Hard Look at the U.S. National Drug Control Strategy

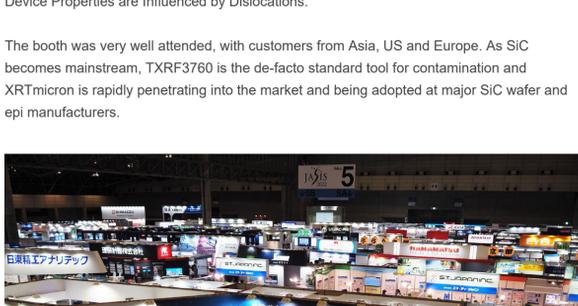
Join Jennifer Lynch and Michael W. Brown as we take a hard look at the current U.S. National Drug Control Strategy.

What do we talk about?

- The Current Administration's National Drug Control Policy
- Michael's Experience as a DEA Subject Matter Expert on the US Council on Transnational Organized Crime
- Can the strategy be effective when there are so many groups involved?
- Why the strategy must prioritize disrupting the Supply Chain

[Listen to podcast >](#)

RECENT EVENTS



The International Conference on Silicon Carbide and Related Materials (ICSCRM)

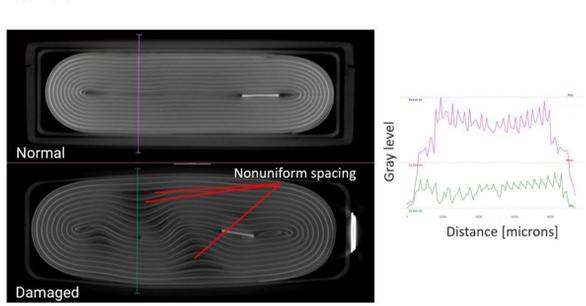
September 11-16, Davos, Switzerland

In September, Rigaku participated in the [International Conference on Silicon Carbide and related Materials](#). The conference is dedicated to the latest developments in the field of silicon carbide manufacturing, characterization and applications. The major drivers for this market are increasing demand for motor drives, growing application of SiC devices in RF and cellular base station, and increasing use of SiC in semiconductors to perform in high-temperature and high-voltage environments. ICSCRM hosted approximately 850 participants representing major players in the SiC field. Rigaku had a strong presence, with a booth, five employees, several posters and an industrial talk.

Two X-ray metrology instruments were presented:

1. Total Reflection X-ray Fluorescence TXRF3760 for detection of metal surface contamination and to improve the quality of Gate Oxide for SiC MOS-FET.
2. X-ray Topography, XRTmicron to quantify dislocation in the substrate and film. SiC Power Device Properties are Influenced by Dislocation.

The booth was very well attended, with customers from Asia, US and Europe. As SiC becomes mainstream, TXRF3760 is the de-facto standard tool for contamination and XRTmicron is rapidly penetrating into the market and being adopted at major SiC wafer and epi manufacturers.



Japan Analytical Scientific Instruments Show (JASIS) 2022

September 7-9, Chiba, Japan

JASIS is the cutting-edge scientific instruments, analytical system & solution exhibition which will support the advances of science, analytical instruments and scientific equipment makers. As Asia's largest exhibition in this field, we will further strengthen collaboration with various leading industries and related organizations worldwide, to contribute to the advancement of science in the future and to find a place for business development.

The Battery Show North America

September 13-15, Novi, MI, USA

The [Battery Show](#) brought together engineers, business leaders, top-industry companies, and innovative thinkers to discover ground-breaking products and create powerful solutions for the future.

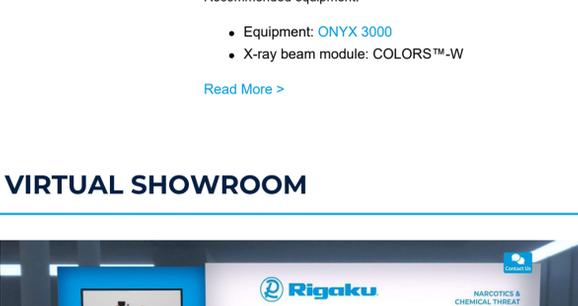
The expertly curated four-track conference featured immersive tracks spanning new methods of advanced battery design and latest technologies, battery manufacturing development, and newly added forecasts of the market supply chain and regulatory outlook. The three-day educational event brought together battery and EV/HEV manufacturers, industry experts, thought leaders, and academics to discuss and help solve manufacturing, supply chain and production challenges.

FEATURED PRODUCT

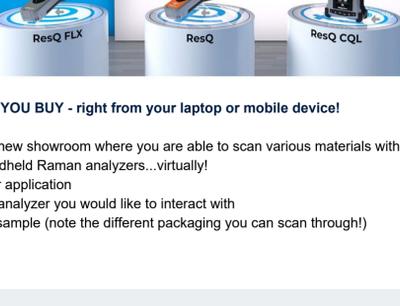
X-ray micro-CT (computed tomography) is a powerful tool that allows researchers to look inside batteries in a non-destructive way. Swelling and delamination after repeated use can be visualized and quantified without opening the packages.

For example, you can study the internal dimensions of 3D printed objects or voids and cracks in molded parts. Failure analysis of battery products is needed to understand product defects. X-ray CT is effective for failure analysis of multilayered battery cells used for battery products without disassembling them.

[Read more>](#)



CT Lab HX for versatility



Rigaku CT Lab HX is a benchtop micro-CT scanner. The adjustable SOD ([sample-to-object distance](#)) and SDD ([source-to-detector distance](#)) make this benchtop micro-CT scanner flexible. It covers from 2.2 um voxel resolution in the high-resolution mode to 200 mm FOV ([field of view](#)) in the large FOV mode. The CT Lab HX is equipped with a 130 kV - 39 W high power X-ray source. The FOV, resolution, X-ray source settings, and X-ray filters are adjustable to optimize the X-ray energy to various sample materials and sizes.

To find out more about Rigaku solutions for battery, please download our [flyer](#).

FEATURED APPLICATION NOTES

How to evaluate solid pharmaceutical drugs (1) Confirming the crystal form of an API

Rigaku Corporation

Active pharmaceutical ingredients (APIs) may undergo phase transitions to crystal polymorphs or pseudo-crystal poly-morphs due to temperature, humidity, etc. Distinguishing each crystal polymorph and performing quantification are necessary in the development and production of pharmaceuticals when multiple crystal or pseudo-crystal polymorphs are present, since each crystalline polymorph has a different solubility and rate of absorption into the body.

This application note introduces how to determine the crystal structure of a sample containing crystal polymorphs.
[Read More >](#)

The analysis of sulfur, calcium, vanadium, iron, and nickel in crude

Applied Rigaku Technologies

Sulfur, vanadium, and nickel occur naturally in crude oil, and their concentrations vary depending on the geographical region of the oil deposits. Depending on the region, some crude may also contain measurable levels of calcium and iron. High metal content can foul the refining process during cracking, and so low metal content is desirable. At the refinery as well as midstream at pipelines, transportation, gathering points, and during blending, a quick and easy means of screening and monitoring the metal content is a valuable tool in characterizing the quality of the crude before refining. Rigaku NEX DE EDXRF analyzer is an ideal multi-element tool for monitoring the concentrations of not only sulfur and metals in crude, resid, and other heavy hydrocarbons.
[Read More >](#)

Measurements of AgSn micro solder bump using monochromatic micro X-ray beam

Rigaku Semiconductor Metrology Division

The polycapillary limitations for low concentration Ag detection and analysis are due to the low excitation and high background. As copper pillar dimensions are reduced, the amount of Ag decreases. A more sensitive method is required. COLORS-W measurement gives similar spot size and excellent repeatability results for Ag/Sn ratio while using lower acquisition time compared to traditional polycapillary optics. Recommended equipment:

- Equipment: **ONYX 3000**
- X-ray beam module: **COLORS™-W**

[Read More >](#)

VIRTUAL SHOWROOM

TRY BEFORE YOU BUY - right from your laptop or mobile device!

Check out our new showroom where you are able to scan various materials with Rigaku's portfolio of handheld Raman analyzers...virtually!

1. Choose your application
2. Choose the analyzer you would like to interact with
3. Select your sample (note the different packaging you can scan through!)

[Try it out >](#)

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