



APRIL 2022, ISSUE 106

WELCOME

Last week, on April 22, [Earth Day](#) was celebrated as a "reminder to protect the environment, restore damaged ecosystems and live a more sustainable life." Awareness and education of the effect humans are having on the environment began last century—by addressing the reduction of greenhouse gases, for example, or by using alternative energy sources in our cars—and are now filtering into almost every element of our work, recreational and consumer habits. Terms such as "low carbon footprint," "sustainable" and "eco-friendly" are commonplace, used to extoll the virtues of a product or activity.

But who decides what is sustainable or green or zero-waste? There are many ways to present eco-credentials as being carbon offset or carbon neutral. Thankfully, scientists can measure both the composition of materials and the by-products created during processing with enormous accuracy. Sulphur content in fuel and exhaust can be measured by elemental or thermal analysis, for example. Understanding the composition of geological samples helps evaluate their best use or discriminate for contaminants hazardous to health. Measurements like these can be supported by XRD, WDXRF or EDXRF analyzers such as those provided by Rigaku, and we strive to help humanity in the challenges we face to preserve or enhance our environments.

UPCOMING RIGAKU WEBINARS

Thermal Analysis Technical Seminar: Evaluation of Pharmaceutical Products by Thermal Analysis

June 16, 2022 1 AM | CST

This webinar will focus on the pharmaceutical applications evaluated by common methods in thermal analysis such as STA, DSC, MTDSC and evolved gas analysis.

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VIDEO OF THE MONTH



Earth Day 1970-2022: What's Changed?

From the American University of Natural History. The first Earth Day was in 1970. What's changed since? Our population has doubled. We're emitting 2.6 times more CO₂. Sea levels have risen 12 centimeters. But the world has also changed for the better. See how our actions since 1970 have added up.

FEATURED APPLICATION NOTES



XRD

Crystal Defect Analysis of a Single Crystal Substrate by X-ray Reflection

Rigaku Corporation

Crystal defects in epitaxial thin films may cause problems when producing high-performance semiconductor devices. Epitaxial thin films may inherit crystal defects from the single crystal substrate. It is important to evaluate the grains and crystal defects of the single crystal substrate before film growth on it. X-ray topography is an XRD imaging technique used to observe crystal defect distribution in a single crystal substrate. The SmartLab automated multipurpose X-ray diffractometer, equipped with an XTOP high-sensitivity and high-resolution X-ray camera, is capable of obtaining high-resolution topographs like those measured with dedicated equipment.

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WDXRF

Semi-Quantitative Analysis for Geological Samples

Rigaku Corporation

Requirement of quick determination of elements in geological samples has been increasing for industries, environment and earth science. They are, for example, exploration of resource, operation of mining, discrimination of contaminated materials hazardous to environment and human health and characterization for geochemical profiling. Geological samples are generally composed of wide and various elements. Therefore, the analysis method for such unknown samples requires flexibility in addition to quickness. Semi-quantitative analysis in modern XRF instruments is a unique method which is performed without any reference materials used for the unknown sample analysis.

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WDXRF

Lubricating Oil Analysis by Benchtop WDXRF According to ASTM D6443-14

Rigaku Corporation

Lubricating oils are given specific functional properties by mixing additives with base oil. In order to assure consistent and desirable performance, it is very important to control the concentrations of the additives during the lubricant manufacturing process.

X-ray fluorescence (XRF) spectrometry has become increasingly popular for quantitative elemental analysis of base oils as well as additives and lubricant products due to its high precision and simple sample preparation. With liquids, sample preparation for XRF typically means simply pouring the sample into a plastic cell with a transparent film. Unlike other techniques, such as Inductively-Coupled Plasma Optical Emission Spectroscopy (ICP-OES), XRF does not require time-consuming processes such as chemical decomposition, digestion or serial dilution.

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EDXRF

EDXRF System for use in Academia and Teaching

Applied Rigaku Technologies

XRF has become a popular analytical technique in industry around the world, as well as in academia for teaching and basic research. The technique is simple, fast and non-destructive. Use Rigaku EDXRF systems from Applied Rigaku Technologies in such disciplines as chemistry, material sciences, physics, and geology. Rigaku EDXRF systems are also valuable tools in basic research for elemental spectroscopic analysis as well as industrial process control.

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MATERIALS ANALYSIS IN THE NEWS



Rigaku Europe SE will host Pharma Forum 2022 on April 27-28 as an online event. During the forum, we will discuss the application of scientific methods in research, development, and the production of pharmaceutical products. Register [here](#) for the Rigaku Pharma Forum and discuss your research results with senior scientists, industry experts and laboratory professionals. Share your experiences and provide feedback to Rigaku so we can develop better tools and analytical techniques. There is no charge for registration and participation in this event.

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