



SEPTEMBER 2021, ISSUE 99

WELCOME

This month, *The Bridge* has a specific emphasis on metals and alloys. In addition, the Summer 2021 edition of the *Rigaku Journal* has been released and there are links to the articles at the end of the newsletter.

Quality production of metals and alloys demands control of material properties throughout the entire process, from raw material to finished product. The speed and precision of X-ray fluorescence (XRF) elemental analysis make it a preferred testing method in high sample throughput chemical analysis. In addition to alloy stoichiometry, X-ray diffraction (XRD) examines phase composition, retained austenite concentration or residual stress, which correlate with structural quality of your products.

UPCOMING EVENT

Rigaku Workshop at Gulf Coast Conference

Oil Sample Solidification: A Unique Approach to XRF Analysis of Petroleum-Based Samples

Currently Scheduled: 10/12/2021 - 2:00 PM - 3:00 PM

Main Author: Glenn Williams, Rigaku Americas Corporation

Additional Authors: Thanh Nguyen, Rigaku Americas Corporation

Abstract:

Three significant challenges to the traditional thin film sample cups used in direct X-ray fluorescence (XRF) oil analyses are: 1) leakage that can occur during either analysis or in queue before or after analyses, 2) key analyte settling that can give rise to higher or lower than nominal values, and 3) the inability or reduced sensitivity that this preparation technique affords the analysis of light element analytes. Oil solidification sample prep techniques provide a potential solution to all these challenges, as well as providing additional benefits.

This training session will provide live hands-on demonstrations of solidification and analyses of a variety of petroleum-based oils as well as examples and comparisons of the analytical results.

[Read Associated XRF Brief >](#)

View it on our LinkedIn page [here](#).

FEATURED APPLICATION NOTES



EDXRF

Phosphorous on Steel

Applied Rigaku Technologies

Aluminum and steel are often coated with a protective conversion coating, also called passivate or passivation coating, to prevent oxidation and corrosion of the base metal. Conversion coatings include Cr, Ti, V, Mn, Ni, P or Zr. A phosphate coating may be applied as to minimize wear on cutting tools and stamping machines. Aluminum is often coated for use in aircraft parts, aluminum window frames and other similar industries where the aluminum is exposed to weathering. Steel for the automotive industry is typically first galvanized with a zinc coating before the conversion coating is applied. Protected steel is also used for outdoor sheds and other similar uses where steel is exposed to weathering. Conversion coating also help in the retention of paint for the final finished product.

In this application note, the measurement of phosphorus (P) conversion coating on galvanized steel is demonstrated using a Rigaku NEX QC+, EDXRF spectrometer.

[Read More >](#)



WDXRF

Accurate Quantitative Analysis of Ferrosilicon by the Fusion Method Using ZSX Primus III+

Rigaku Corporation

Ferrosilicon is one of the most basic materials used in the steel making process. Iron alloys with silicon content between 15% and 90% are called "ferrosilicon," and are used in the reduction of the iron, removing oxygen and adding silicon when cast iron or steel alloys are produced. As part of controlling the steel making process, analyses of slag and raw materials such as quicklime are also required. X-ray fluorescence spectrometers are the most common analysis tools to analyze ferroalloy, slag, steel and added materials owing to the rapid analysis and the ability to measure both bulk metal and powders. This application note describes accurate ferrosilicon analysis using ZSX Primus III+, which is optimized for process control of steel making and ferrosilicon production.

[Read More >](#)



LIBS

Solving Carbon Equivalence with Handheld LIBS

Rigaku Analytical Devices

It is critically important to ensure the right grade of steel is being used for an application. However, being dependent on the grade alone can be a risk, as there can be significant variations even within a grade. Problems with weld integrity can occur due to variances in the exact composition. Variances in metal alloy grades happen because of secondary production of metal alloys from recycled materials produced in an electric furnace. Secondary production introduces residual elements to the process. These residual elements typically include vanadium (V), manganese (Mn), chromium (Cr), molybdenum (Mo), copper (Cu), and nickel (Ni). This means precise measurements of the exact composition of each individual piece are necessary to determine how the component will behave.

[Read More >](#)

FEATURED PRODUCT



Supermini200

High-power Benchtop Sequential WDXRF Spectrometer

The Rigaku Supermini200 offers superior fundamental parameters and empirical software capabilities in a high-resolution instrument with a compact footprint. As a high-power benchtop sequential wavelength dispersive X-ray fluorescence (WDXRF) spectrometer, for elemental analysis of oxygen (O) through uranium (U) in almost any material, the Supermini200 uniquely delivers low cost-of-ownership (COO) with high resolution and lower limits-of-detection (LLD).

[Read our new brochure here >](#)

UPCOMING RIGAKU WEBINARS

Thermal Analysis Technical Seminar: Let's Evaluate Materials With TMA! Principles, Applications and Tips

October 21, 2021 2 AM | CDT

This webinar is a beginner's course. The presentation will focus on basic principles of thermomechanical analysis (TMA) and the different modes that are available based on sample shape and measurement objective. During the presentation, we will also highlight applications and show some videos on changing attachments.

[Read More >](#)

USEFUL LINKS

The new edition of the *Rigaku Journal* is now released. You can read any of the articles by clicking on a title below.



SUMMER 2021, VOL.37, NO.2

Utilization of X-ray diffraction data in machine-learning based material exploration for all-solid-state lithium batteries

Kota Suzuki, Masaaki Hirayama, and Ryoji Kanno

Lithium-ion batteries are secondary (rechargeable) batteries that are used for a wide range of applications, from mobile devices to electric vehicles, as they combine both high energy density and excellent power characteristics. In recent years, research has been conducted toward the realization of an all-solid-state lithium battery, in which the...

Standardless FP XRF analysis for lithium ion battery electrode materials

Hikari Takahara and Hironori Kobayashi

Standardless FP X-ray fluorescence analysis is a quantification method using theoretical calculations including fundamental parameters. The analysis method has been widely used in the electronics and petrochemical industries, among others, since it can simply and quickly quantify sample compositions from spectral peak intensities without preparing calibration curves. In this report, the standardless FP...

X-ray analysis of a magnesium alloy expected to be a useful lightweight material

Akimitsu Nezu, Wataru Matsuda, and Junichi Sato

Weight saving is an important challenge for various industries, including transportation (automotive, aeronautical, or bullet-train manufacturing), electronic devices, and intelligent robotics. Finding lighter-weight materials is, therefore, a popular research subject because of its potential impact on people's daily life. This is especially true in the modern automotive industry, where better...

Powder X-ray Diffraction Basic Course | Third Installment: Sample preparation and measurement conditions to obtain high-quality data

Masashi Omori

In the second installment of the powder X-ray diffraction (PXRD) basic course, how to select instrument configurations to obtain high-quality data was described. This third installment provides information on how to prepare samples and determine the best measurement conditions to obtain high-quality data. Regarding sample preparations, the type of sample...

Machine learning and application to spectral analysis on TXRF spectrometry

Makoto Doi and Shinya Kikuta

Total Reflection X-ray Fluorescence (TXRF) analysis is a non-destructive and surface-sensitive analysis method using X-rays, in which incident X-rays are irradiated on a sample at an extremely low grazing angle (about 0.1°) and the fluorescent X-rays from the sample generated by the incident X-rays are measured with extremely low background...

Non-destructive characterization of crystallographic defects of SiC substrates using X-ray topography for R&D and quality assurance in production

Christian Reimann and Christian Kranert

One of the major technical challenges of this decade are energy efficient technologies, which is among others, comparable in its importance to Artificial Intelligence, 5G and IoT. Innovative silicon carbide (SiC) technology and components will contribute significantly towards the goal of a greener, energy efficient and sustainable economy. SiC also...

XtaLAB Synergy-ED: An Electron Diffractometer for Routine Single Crystal Diffraction Studies

Recognizing the potential of MicroED, Rigaku and JEOL announced a collaboration in 2020 to develop a new product designed in a fashion that will make it easy for any crystallographer to use. The resulting product is the XtaLAB Synergy-ED, Figure 1, a new and fully integrated electron diffractometer, that creates...

Dynamic DSC Software —Temperature-Modulated DSC—

Differential scanning calorimetry (DSC) is a thermal analysis technique that measures the change in heat capacity of a sample, or endothermic/exothermic reactions, based on the difference in temperature between a sample and a reference material that are both heated/cooled at a predetermined constant rate. This technique is widely used...

Hand-held LIBS with High-Resolution Echelle Spectrometer Rigaku KT-500 Rapid Analysis of Carbon in Steel and High Performance Analysis of Stainless and High Temperature Alloys

The Rigaku KT-500 hand-held analyzer represents the next advancement in handheld laser induced breakdown spectroscopy (LIBS). Building on the capability of the KT-100 Series analyzer, the KT-500 adds High Resolution Echelle Spectrometer (HIRES) technology for rapid...

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