



橋 THE BRIDGE

MATERIALS ANALYSIS eNEWSLETTER

JANUARY 2022, ISSUE 103

WELCOME

A happy New Year to all our followers, friends and customers. We hope that 2022 brings great success to you all.

Towards the end of last year, an article provocatively titled "[What is the Point of Analytical Science?](#)" caught my eye. The motive behind this article was to raise awareness of a European conference aimed at bringing analytical science disciplines together and attracting young talent to the field, but the author, Lutgarde Buydens, also encapsulated the reason many scientists are driven to analytical science:

A common drive to "solve practical problems with real world implications" was observed among many scientists, with many analytical applications directly related to improving the welfare of our planet; for example, in environmental monitoring, improving recycling processes, or developing green technologies, thereby providing a benefit to society. The emphasis of this article resonates with Rigaku's corporate mission to "contribute to the enhancement of humanity through scientific and technological development," and we strive to support this goal.

This newsletter includes the latest application notes from our XRD and WDXRF scientists, with a focus on Portland cement analysis. Read about how EDXRF can be used to detect corrosion in piping of cooling towers at power stations and, in consideration of the recent global news story, watch a video on how analytical science plays a role in predicting volcanic eruptions. Finally, read another exciting tale about how Rigaku's handheld Raman device featured in the interception of a very large drug haul.

UPCOMING RIGAKU WEBINARS

Thermal Analysis Technical Seminar: What Can Be Seen By Using Humidity Controlled Thermal Analysis?

February 10, 2022 12 AM | CST

This webinar is a beginner's course. The seminar will focus on the use of humidity-controlled atmosphere in thermal analysis. We will show some applications on how water vapor atmosphere affects the thermal behavior of different materials such polymers, pharmaceuticals and other materials.

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VIDEO OF THE MONTH



Scientists use tiny crystal balls to predict volcanic eruptions

Dr. Ubide, from the University of Queensland's [School of Earth and Environmental Sciences](#), used a new laser technique to examine the composition of tiny crystals forming deep in volcanoes, which may be the key for advance warnings before volcanic eruptions.

FEATURED APPLICATION NOTES



WDXRF

Cement Analysis by the Pressed Powder Method on Benchtop WDXRF Supermini200 According to ASTM C114-18

Rigaku Corporation

Cement is one of the most important materials for construction. Many kinds of hydraulic cements, including Portland cement, with various physical properties are produced by changing the composition of clinker minerals; therefore, it is important to control the chemical composition of cement products and interim products.

ASTM C114-18 covers chemical analysis of hydraulic cement. In this standard, mainly wet chemical analysis procedures are described, and X-ray fluorescence (XRF) spectrometry is mentioned as an example of "Rapid Test Methods." In practice, XRF spectrometry has been used for chemical composition analysis of cement owing to its simple sample preparation and high precision.

This application note demonstrates quantitative analysis for Portland cement by the pressed powder method according to ASTM C114-18 on Rigaku Supermini200, a benchtop sequential wavelength dispersive XRF spectrometer.

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XRD

Quantification of Blast Furnace Slag in Blast Furnace Cement by Rietveld Refinement

Rigaku Corporation

In recent years, blended cement—cement into which additional constituents are mixed—has been widely produced with the aim of reducing environmental impact. According to JIS (Japanese Industrial Standard) R5211, blast furnace cement mixed with Blast Furnace Slag (BFS) is classified into three types according to the mixing ratio of BFS: Type A (from 5 to 30%), Type B (from 30 to 60%), and Type C (from 60 to 70%). Type B blast furnace cements mixed with 40-45% BFS are popular blast furnace cements. For quality control of blast furnace cement, quantitative analysis of BFS is normally performed by the Rietveld refinement combined with a standard material, because BFS is an amorphous component. In this example, BFS in blast furnace cement was quantified by Rietveld refinement using the reference intensity ratio (RIR) without a standard material.

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EDXRF

Nuclear Power Station Cooling Water Filters

Applied Rigaku Technologies

Excessive metal content can contribute to corrosion in the piping used in the cooling systems in power stations. Corrosion is minimized by the selection of metal alloys used for the pipes and the chemistry of the cooling water itself.

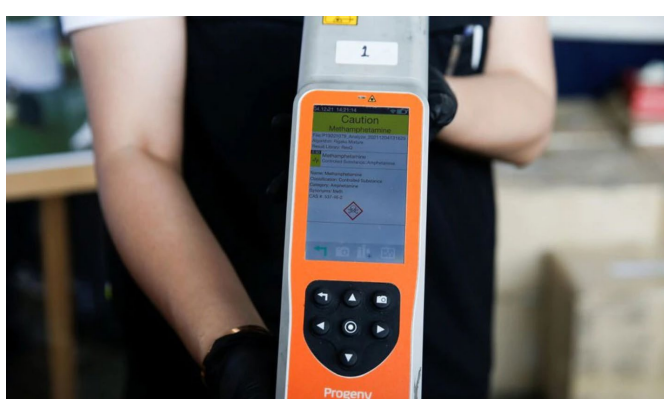
The cooling water is monitored for excessive metal content using both Millipore and Cation filters. The filters are then analyzed to determine concentrations of Fe and Cu, as well as other unwanted metals such as Ni, Zn and Pb. To meet the analytical demands of the industry Applied Rigaku Technologies offers the NEX DE EDXRF analyzer.

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MATERIALS ANALYSIS IN THE NEWS

Handheld Raman in Action

December 4, 2021



The Rigaku Progeny ResQ used in the identification of illicit drugs in Thailand. Image courtesy of Reuters.

Thai authorities intercepted nearly 900 kg (2,000 pounds) of crystal methamphetamine hidden in a cargo shipment at Bangkok's Port Custom Office and bound for Taiwan where it could be sold for up to \$88 million, a customs official said on Saturday.

The drug was seized by customs officials late on Friday, hidden in powder form inside 161 white silicon slabs in packages destined for Taiwan.

"The 897 kg of crystal meth is worth about 500 to 600 million baht (\$15 million to \$18 million), but once they reach their destination they will be worth 3 billion baht in market price," Thai Customs Director-General Patchara Anuntasil told a press conference on Saturday.

[Read the Reuters news article >](#)

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