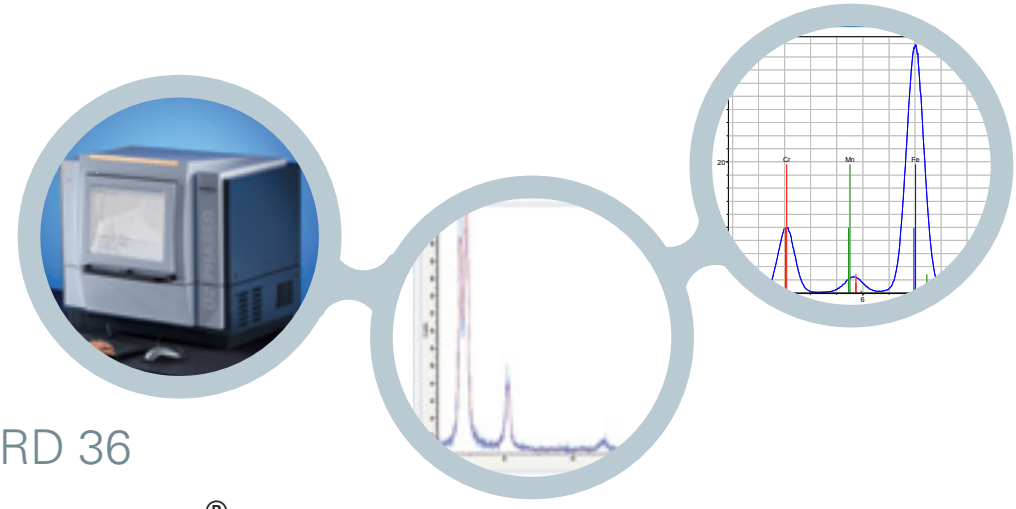


Product Sheet XRD 36

D2 PHASER with XFlash®

Combined XRD, EDXRD and XRF analysis

The novel D2 PHASER with XFlash detector represents the first benchtop system offering X-ray diffraction (XRD), energy-dispersive X-ray diffraction (EDXRD) as well as simultaneous X-ray fluorescence (XRF) measurements under ambient conditions. Based on Bruker's cutting-edge Silicon Drift technology, the XFlash detector features best energy resolution of less than 180 eV (CuKα) at count rate levels of more than 100.000 cps, making it the most versatile detector for a wide range of complementary applications.

For XRD, the superb energy resolution of the XFlash allows for excellent filtration of undesirable Kß, white radiation as well as sample fluorescence for highest quality powder patterns with best peak to background ratio. While for standard powder XRD the K$\alpha_{1,2}$ dublet is employed, the XFlash detector can additionally be be switched to an arbitrary wavelength within the X-ray spectrum. Typically, this would be Kß in order to obtain monochromatic powder patterns with high intensity, avoiding peak overlap inherent to the commonly used Kα radiation (K$\alpha_{1,2}$ doublets).

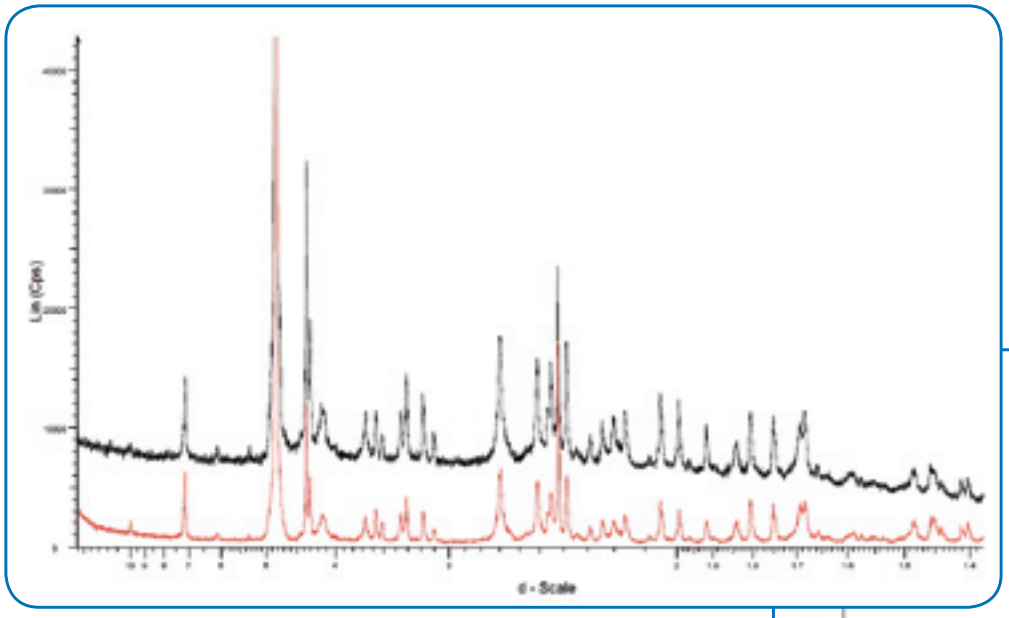
Unique to the D2 PHASER with XFlash is its capability to obtain EDXRD patterns at user-defined 2θ positions. This mode allows extremely fast measurements, as a large wavelength range emitted by the X-ray source is being utilized. At the same time it is possible to perform analysis of coatings, or layers from different penetration depths of the investigated structure.

XRF data are collected simultaneously with either XRD or EDXRD measurements, providing for element identification and monitoring of concentrations (K - Hf). Knowing the

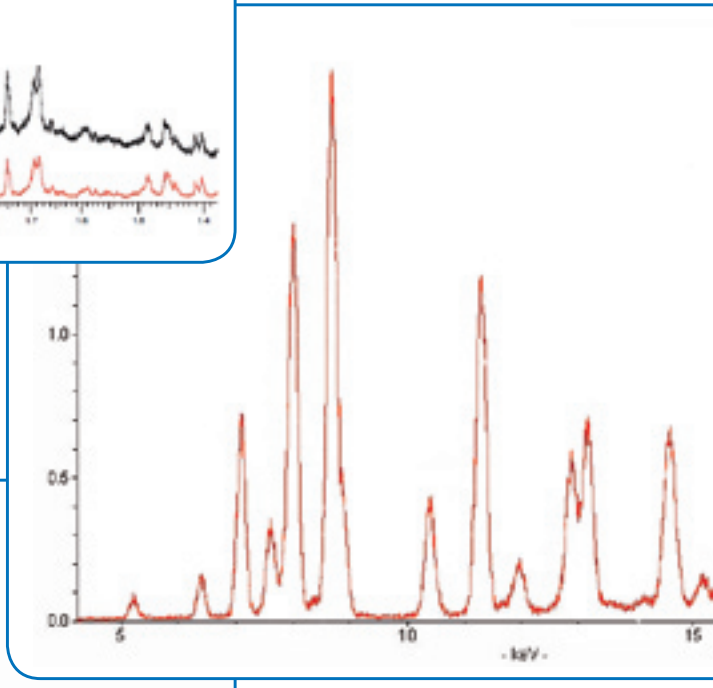
(partial) elemental composition of the sample greatly assists successful phase identification and quantitative analysis of unknown samples or of samples with similar diffraction patterns. Additionally, quantitative phase analysis results can be validated by comparing the calculated elemental composition with the actually measured elemental composition (see Lab Report #58, "Quantitative Analysis of Geological Samples: Combined XRD-XRF Analysis", order number DOC-L88-EXS058).

D2 PHASER with XFlash

Superb suppression of fluorescence:

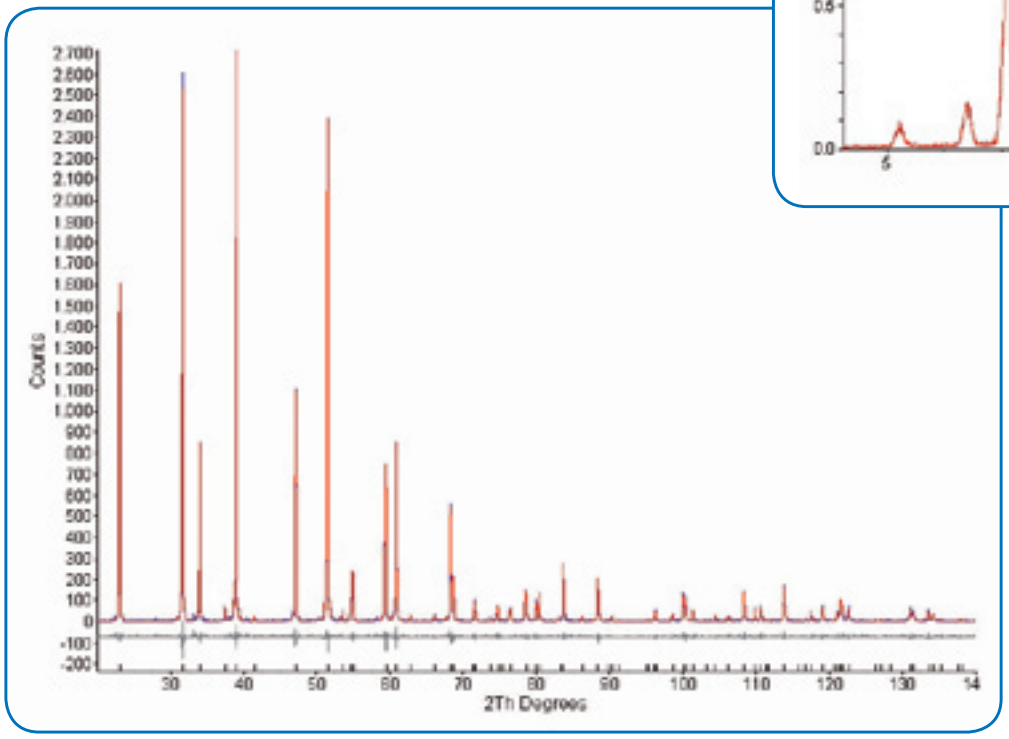


Bauxite sample emitting Fe fluorescence when measured with Cu radiation. Black scan: Conventional detector. Red scan: XFlash detector. Intensities normalized to highlight the peak-to-background improvement.



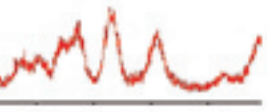
Energy dispersive X-ray diffraction patte
(NIST SRM1976a).

Monochromatic powder patterns:



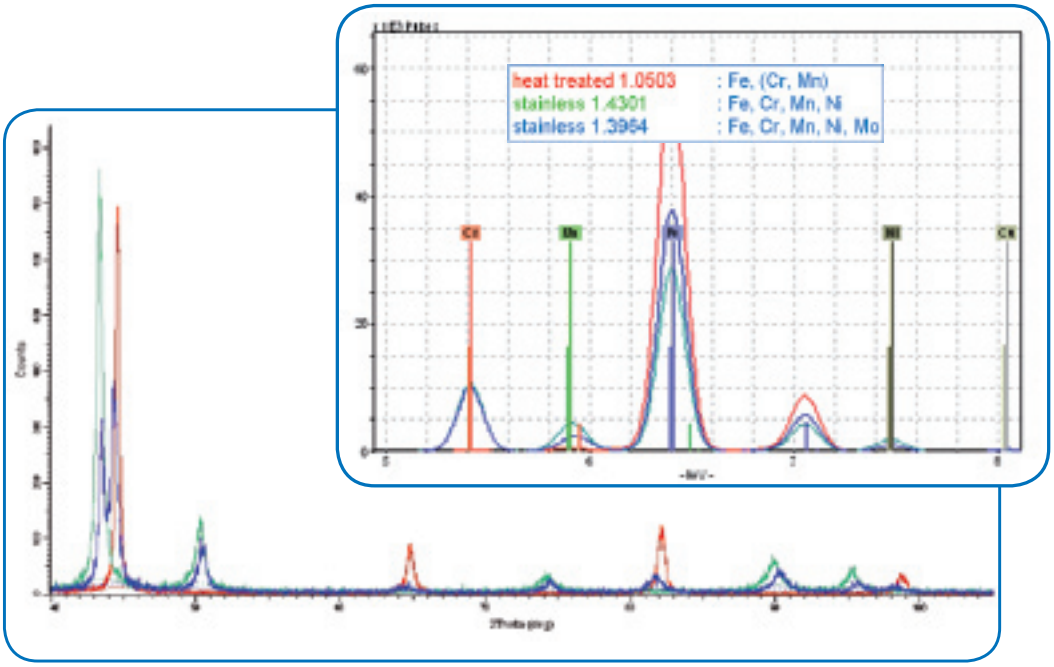
Monochromatic XRD pattern of corundum (NIST SRM1976a) using Kß radiation.

EDXRD measurements



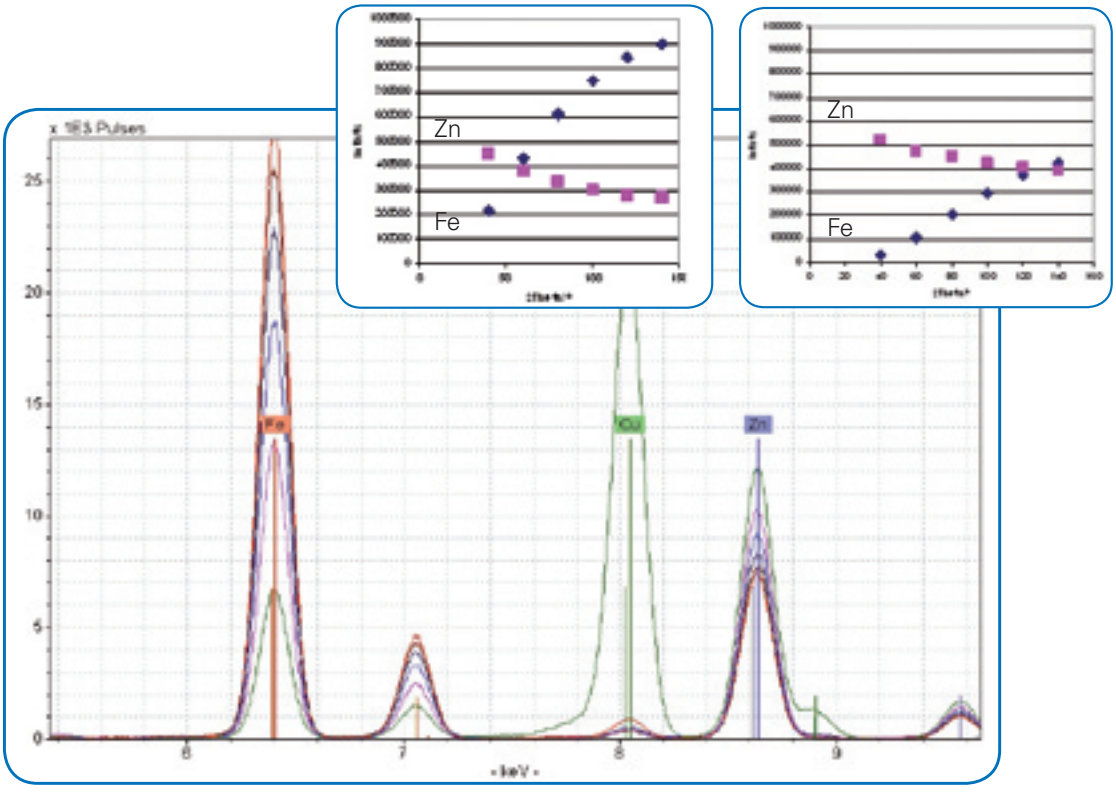
rn of corundum

Simultaneous XRD and XRF measurements:



Combined XRD-XRF analysis of different steel samples

XRF layer thickness calculation:



XRF analysis of Zn coating thickness for 2 layers with 4.9 µm (left) and 9.3 µm (right) thickness, respectively. Spectra measured at different angles 2θ for layer thicknes calculation.

D2 PHASER with XFlash

Key features and applications:

- Angle-dispersive (XRD) as well as energy-dispersive powder diffraction (EDXRD)
  - Outstanding suppression of sample fluorescence for best peak to background ratio
  - Switching to a single wavelength, e.g. CuKb, to minimize peak overlaps
  - FWHM better than 0.05° 2θ (SRM660a, CuKα)
  - Patented high-end goniometer design (EP 2112505)
- Simultaneous acquisition of XRD / EDXRD and XRF data
  - Phase identification, quantitative phase analysis, ab-initio structure determination, structure refinement
  - Element identification and monitoring of concentrations (K - Hf)
  - Analysis of layers: Phase identification, element identification and thickness calculation
  - Pure XRF patterns without Laue peaks when running in XRD mode

Specifications	
Detector type	XFlash Silicon Drift Detector maintenance-free
Active window size	30 mm^2
Energy resolution	<180 eV (CuKα) at 100,000 cps
Cooling	Electrical Peltier cooling
Maximum count rate	1,000,000 cps
Elemental range	K to Hf (~3 to 20 keV)
Operational conditions	Temperature: 0°C - 35°C Humidity: max. 90% rel. H.

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