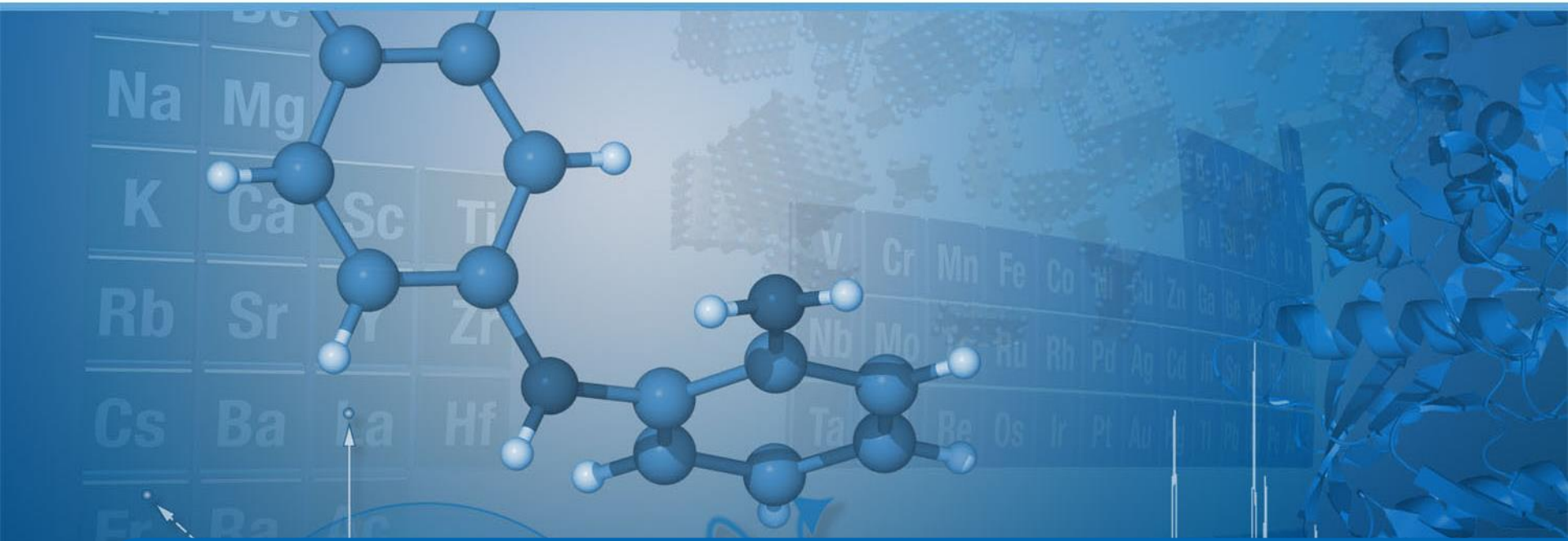
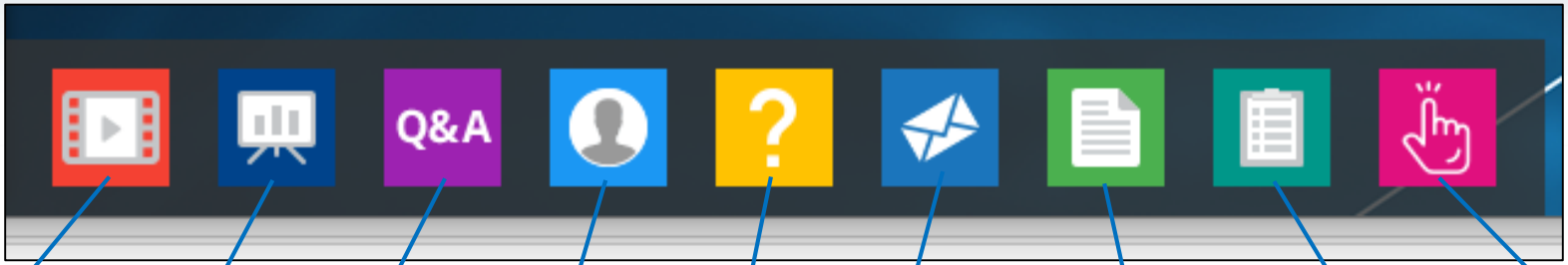
Bruker Booth Ceramics 2020



Interact with Us



- All the tools are resizable and movable. You can expand your slide area or maximize it to full screen by clicking on the arrows in the top right corner.
- If you have any questions during the webcast, you can submit them through the **Q&A** tool.
- You can **Schedule a Meeting** with me at any time to discuss your application and instrumentation needs.
- Check out our **Resource List** to download a copy of today's slides, as well as brochures, application notes and lab reports.
- We recommend closing any programs or browser sessions running in the background, and logging off your VPN if applicable.
- Audio is being streamed through your computer, so there is no dial-in phone number.
- If your slides fall behind with respect to the audio, press the F5 key on your keyboard to refresh the page.
- At the end of the webcast, you'll be presented with an **Exit Survey** – please let us know how we did.
- **Sign Up** for our other upcoming and on-demand webinars at **BAXS Virtual Events 2020**.
- An On-Demand version of this webcast will be available tomorrow at the same audience URL.

Welcome

Shawn O'Brien
Senior Sales Representative – XRF/XRD
shawn.obrien@bruker.com

Overview of Bruker's XRD, XRF and XRM Solutions for Ceramic and Glass Analysis

Nathan Henderson, Ph.D.
Senior Applications Scientist – XRD
nathan.Henderson@bruker.com

Structural Analysis of Ceramics with X-ray Diffraction

Julia Sedlmair, Ph.D.
Applications Scientist – XRF
julia.m.sedlmair@bruker.com

The S6 JAGUAR: A New Benchtop WDXRF Instrument with High Sensitivity

David Sampson
Senior Sales Engineer – XRM
david.sampson@bruker.com

3D X-Ray Microscopy of Ceramics

Overview of Bruker's XRD, XRF and XRM Solutions for Ceramic and Glass Analysis

Shawn O'Brien
Senior Sales Representative – XRF/XRD

Analytical Methods
X-Ray Diffraction (XRD)

D8 DISCOVER
Top-of-the-line
XRD solution for
material research

D8 ADVANCE
Highly versatile
all-purpose
XRD solution

D8 ENDEAVOR
XRD for process
and quality control

D2 PHASER
Powder XRD on
a benchtop

Analytical Methods
X-Ray Fluorescence (XRF)

S8 LION
Ultra-fast, simultaneous XRF for process control

S8 TIGER
Top-of-the-line sequential XRF

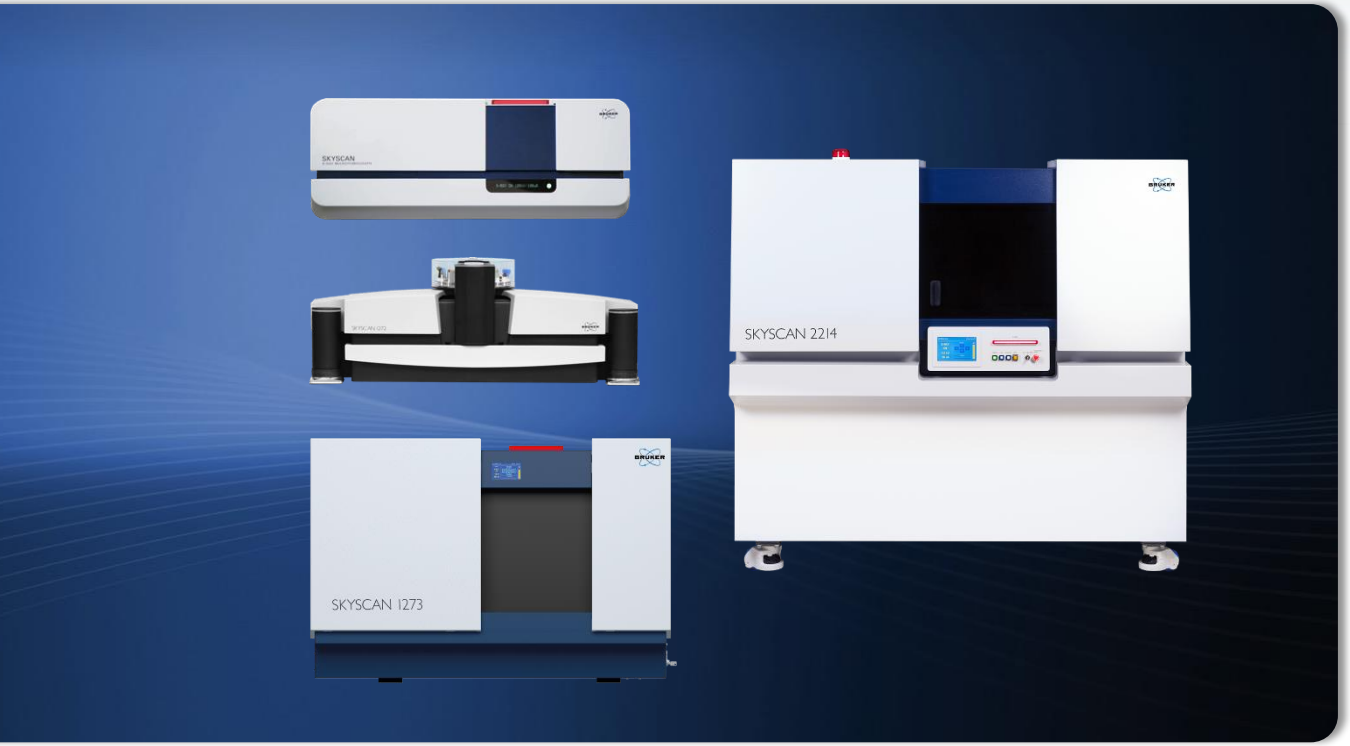
S6 JAGUAR
Full WDXRF performance in a benchtop system

S2 POLAR
Multi-element, polarized EDXRF analyzer

S2 PUMA
Powerful, versatile benchtop XRF

S2 KODIAK
Ultra-rugged XRF for inline process control

Analytical Methods
3D X-Ray Microscopy (XRM)



SKYSCAN 1272
High-resolution 3D X-ray microscopy

SKYSCAN 1273
High-capacity 3D X-ray microscopy

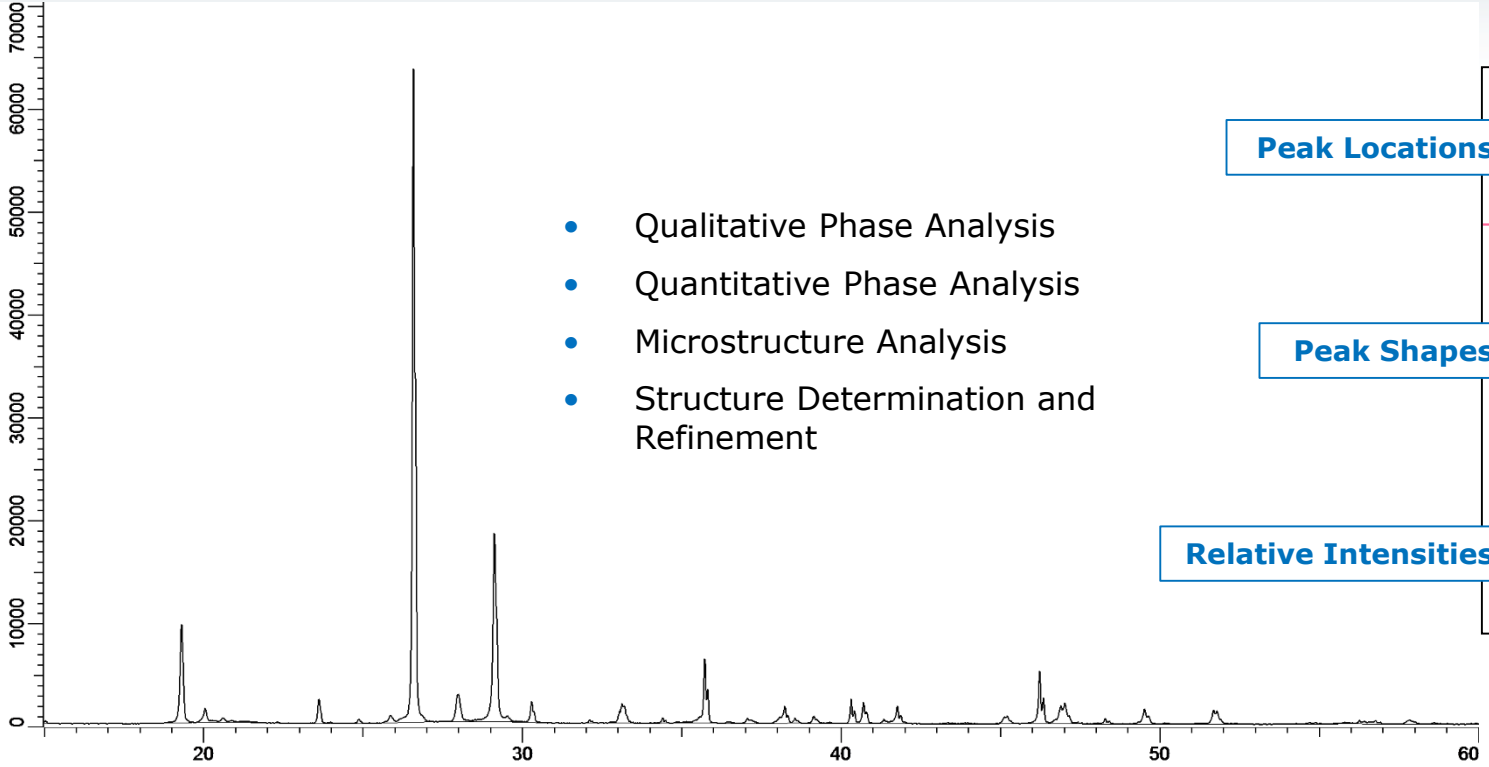
SKYSCAN 1275
3D X-ray microscopy for everyone

SKYSCAN 2214
3D X-ray microscopy at the nanoscale

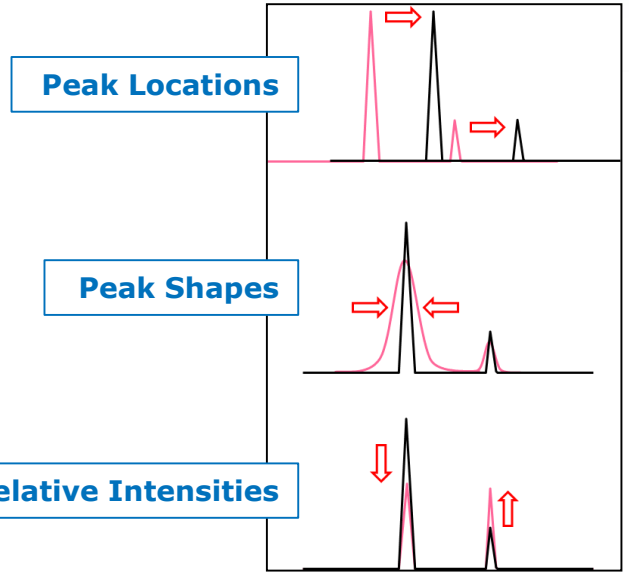
Structural Analysis of Ceramics with X-ray Diffraction

Nathan Henderson, Ph.D.
Senior Applications Scientist – XRD

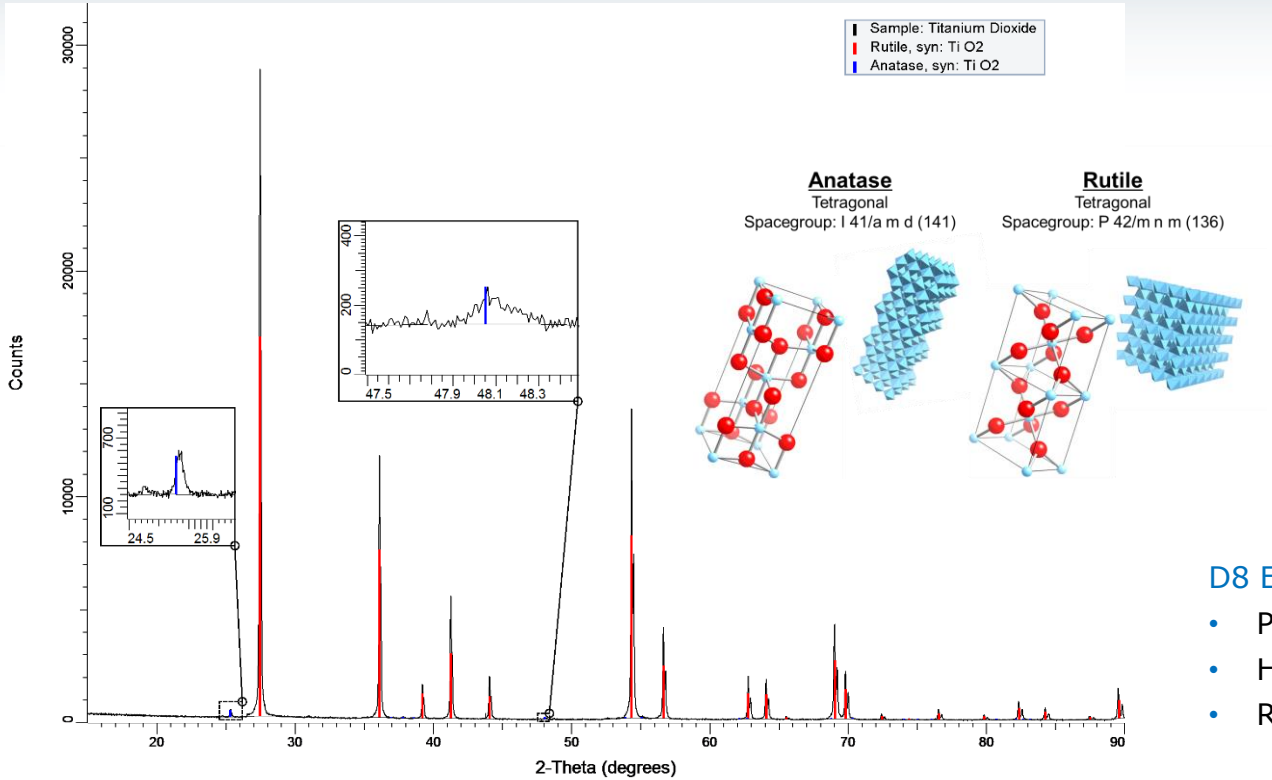
X-ray Diffraction Overview



- Qualitative Phase Analysis
- Quantitative Phase Analysis
- Microstructure Analysis
- Structure Determination and Refinement



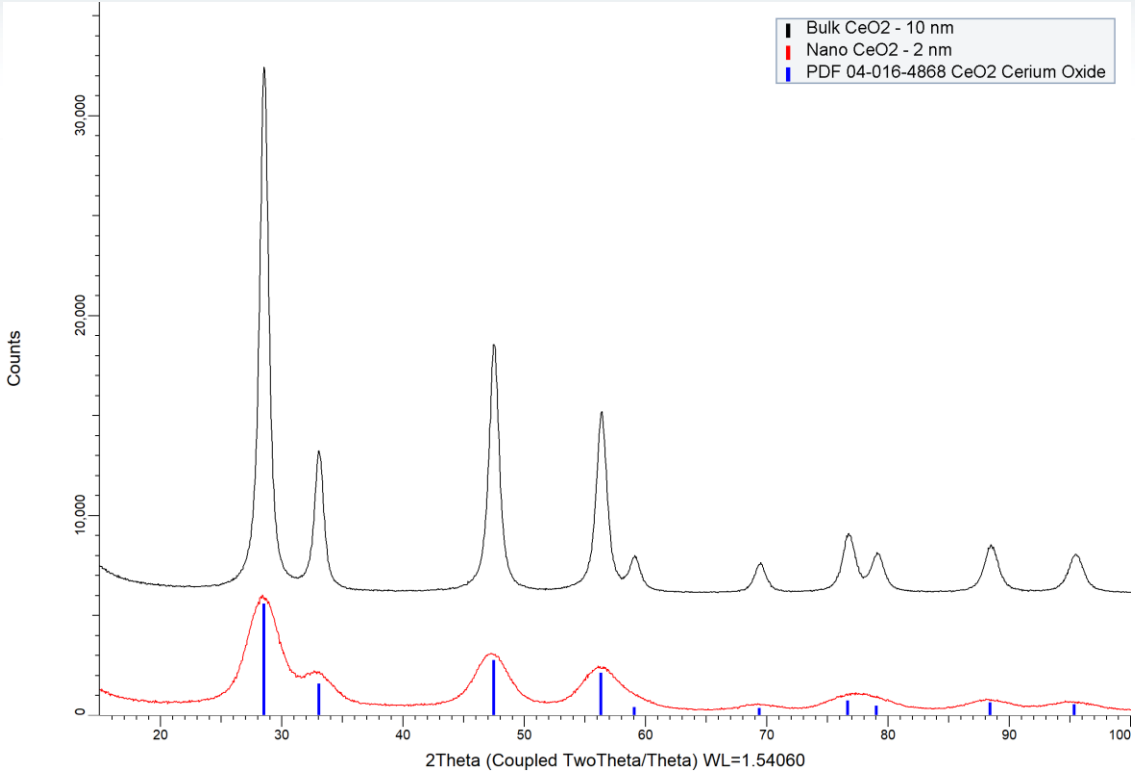
Polymorphism in TiO_2



D8 ENDEAVOR with LYNXEYE XE-T

- Process automation diffractometer
- High sample throughput
- Robust design

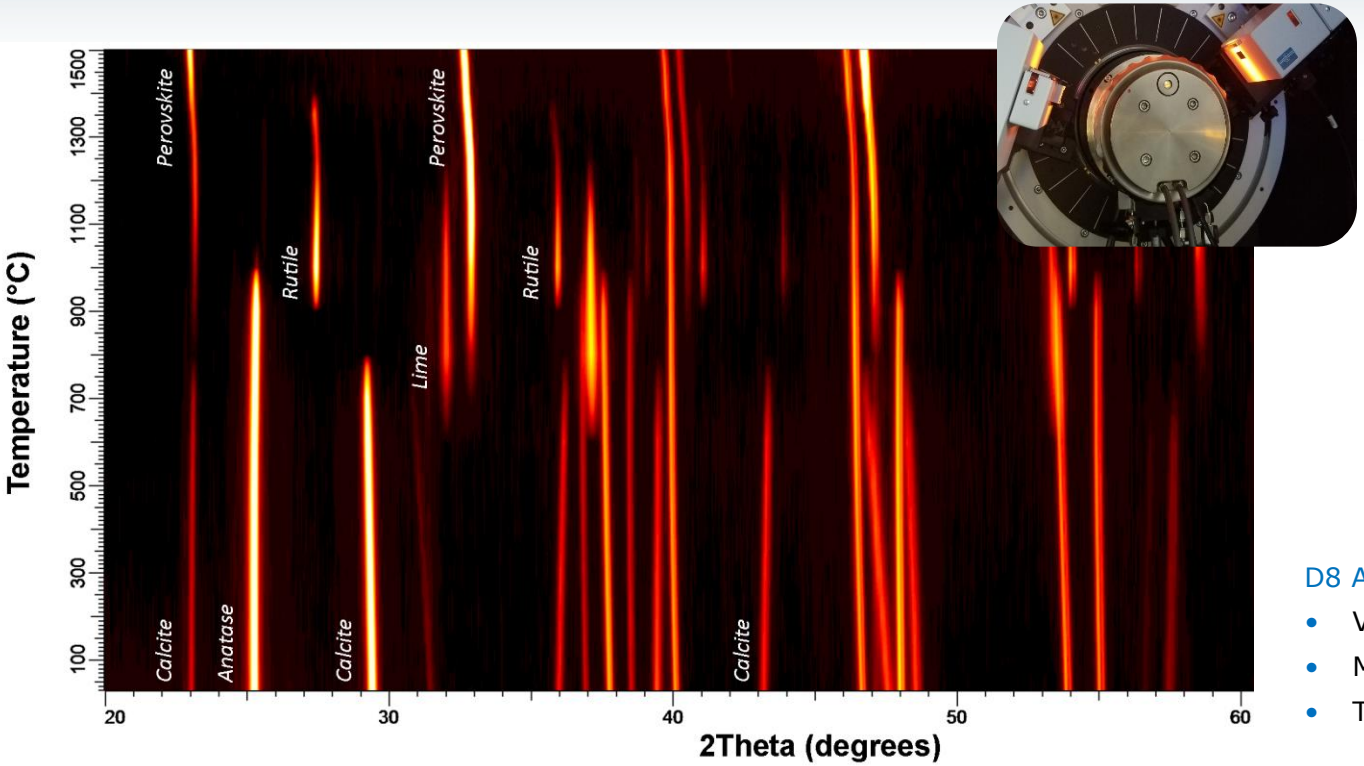
Crystallite Size Analysis of CeO_2



D2 PHASER with LYNXEYE XE-T

- Compact, all-in-one design
- Full-size source and detectors
- Rapid, high-quality data

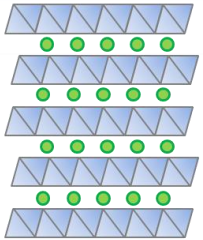
Non-Ambient Diffraction of Ca-Ti-O



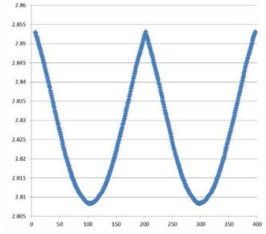
D8 ADVANCE with MTC-HIGHTEMP

- Versatile, modular design
- Multiple detector options
- Temperature studies up to 2300 C

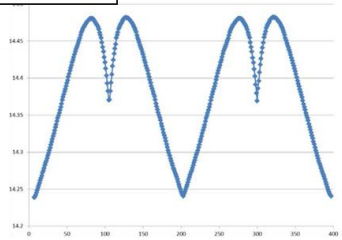
Structural Analysis of Pouch Cells *in Operando*

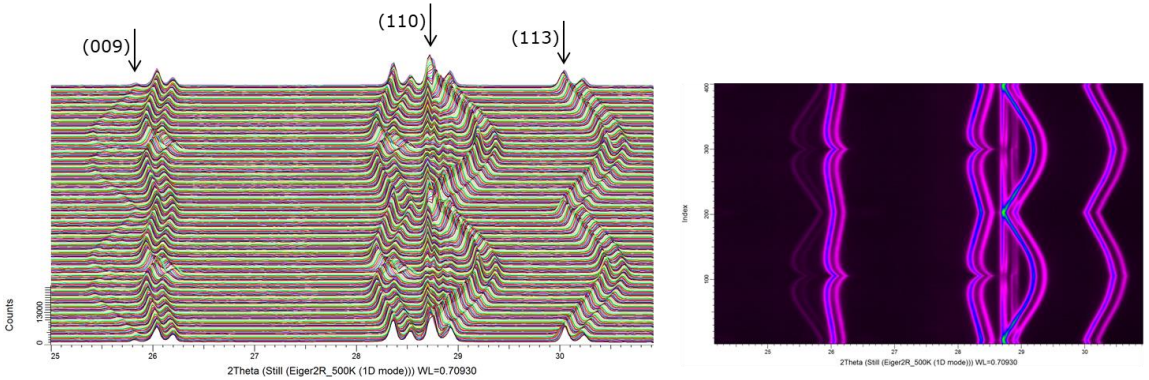


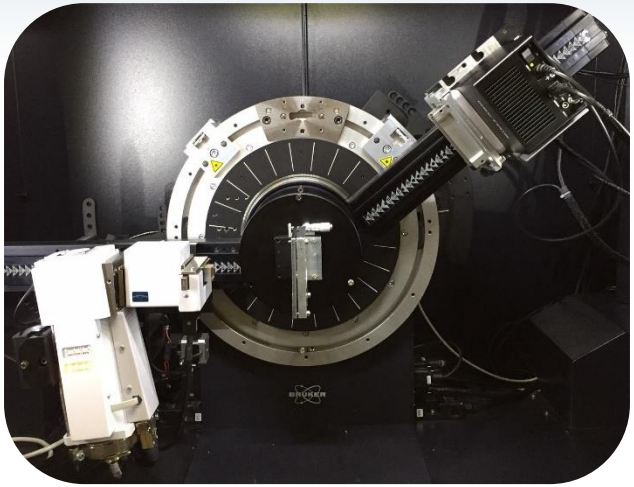
a lattice parameter



c lattice parameter







D8 DISCOVER with EIGER2 R 500K

- Multi-mode detector operation
- Large 1D or 2D coverage
- Rapid snapshot data collection

Q&A - XRD

Please type any questions you may have for Nathan in the Q&A tool and click Submit.

Nathan Henderson, Ph.D.
Senior Applications Scientist – XRD
nathan.henderson@bruker.com

Structural Analysis of Ceramics with X-ray Diffraction

The S6 JAGUAR

A New Benchtop WDXRF Instrument with High Sensitivity

Julia Sedlmair, Ph.D.
Applications Scientist – XRF

S6 JAGUAR
High Performance Benchtop WDXRF

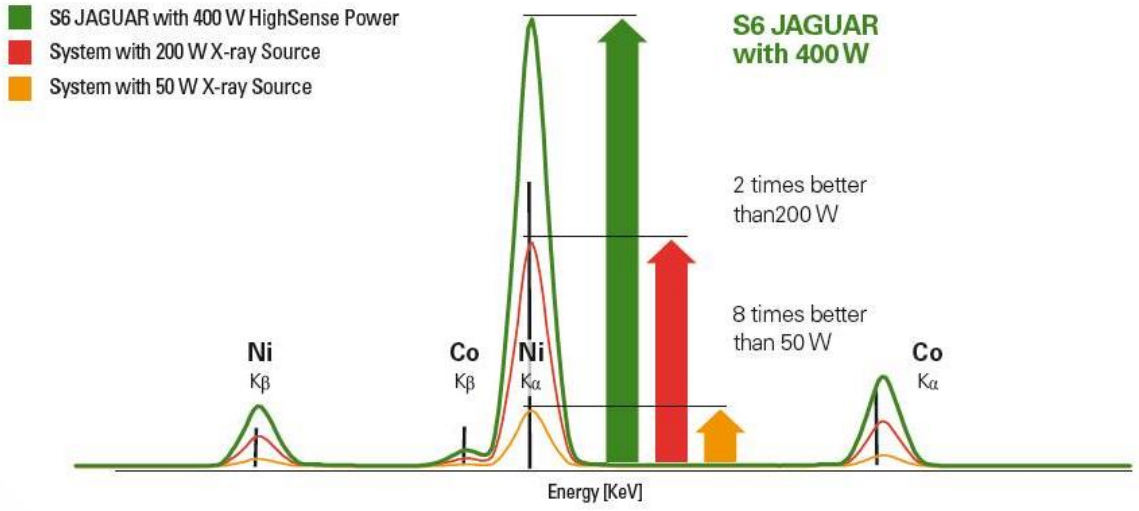
Two sample load configurations perfect for your work load:

- EasyLoad X-Y changer for up to 24 samples with removable tray
- Manual single position

S6 JAGUAR
High Performance Benchtop WDXRF

- Best ease-of-use and reliability with “plug & analyze“
- Elemental range F - Am
- All-new technology and software:
  - Long lifetime X-ray tube
  - Optimized analyzer crystals for the entire element range and special applications
  - Intuitive analytical software SPECTRA.Elements
  - Standardless analysis: SMART-QUANT WD with new FP algorithms

S6 JAGUAR
HighSense™: Full 400 W excitation power



S6 JAGUAR is twice as powerful as a 200 W system

and 8 times more powerful than a 50 W system

S6 JAGUAR Applications

Glass & Ceramics

Minerals & Mining

Metals & Slags

Academic Teaching & Research

Pharma

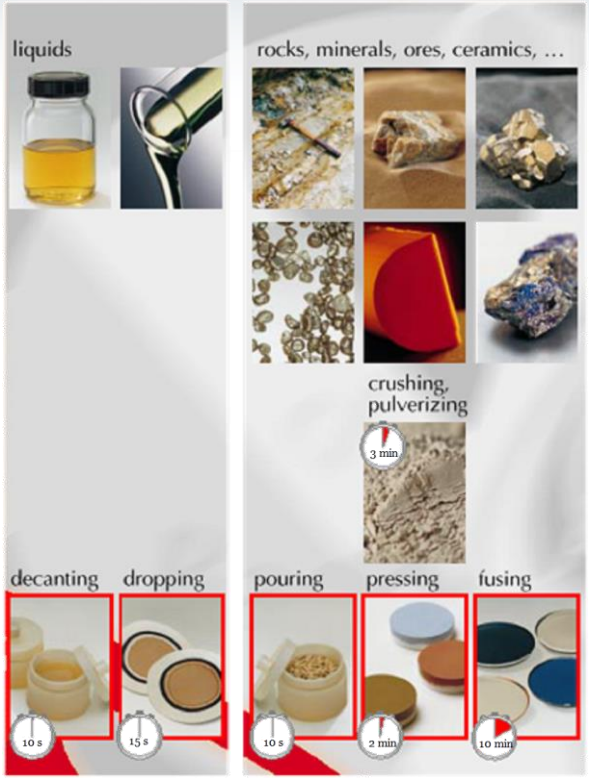
Food & Feed

Cement & Building Materials

Materials Research

Petrochemistry

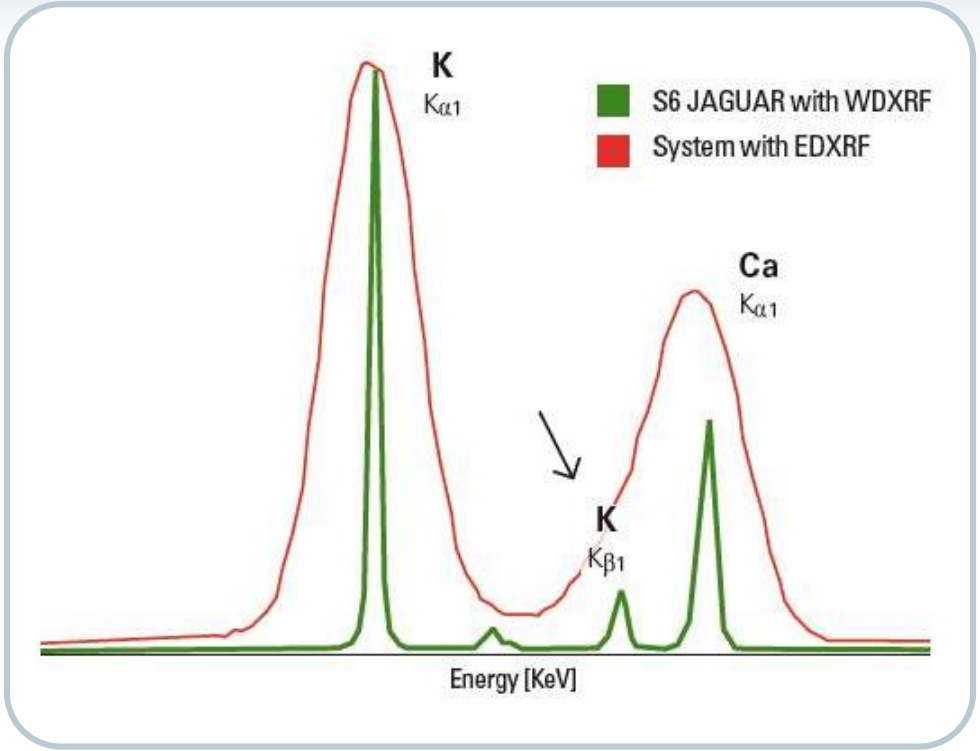
Sample Preparation



Depending on analytical needs, different sample preparations are possible:

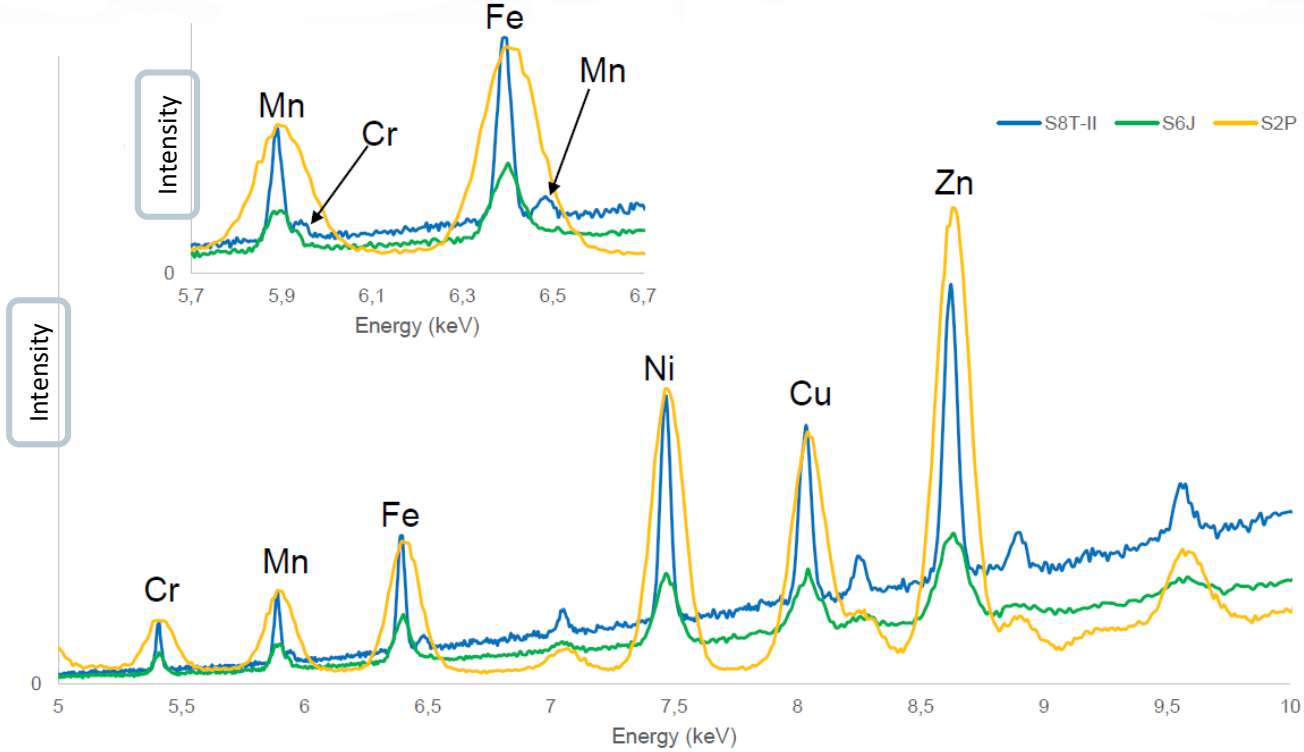
- Powders
- Pressed powders
- Fused glasses
- Liquid dilutions

Why WDXRF – Better Resolution!



The S6 JAGUAR with WDXRF HighSense goniometer exceeds ED-based systems in resolution and analytical precision

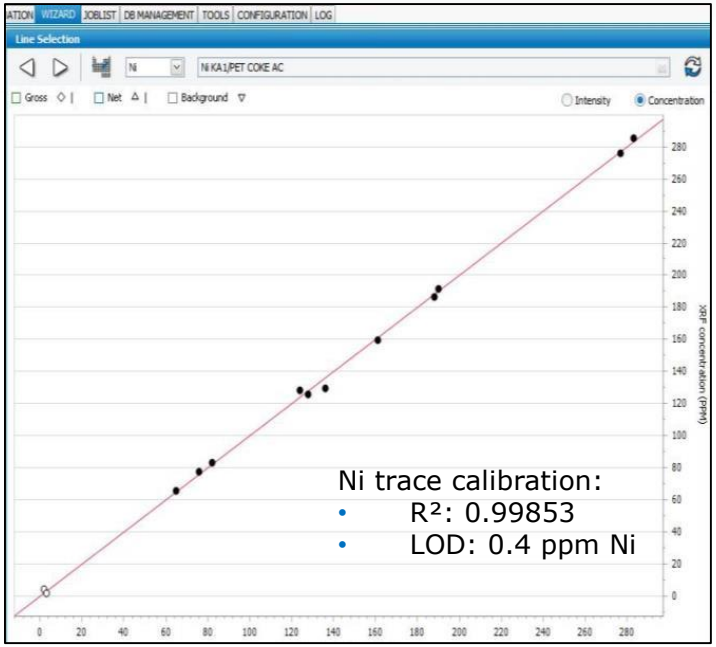
Why WDXRF – Better Resolution!



EDXRF resolution is sometimes not sufficient for certain applications

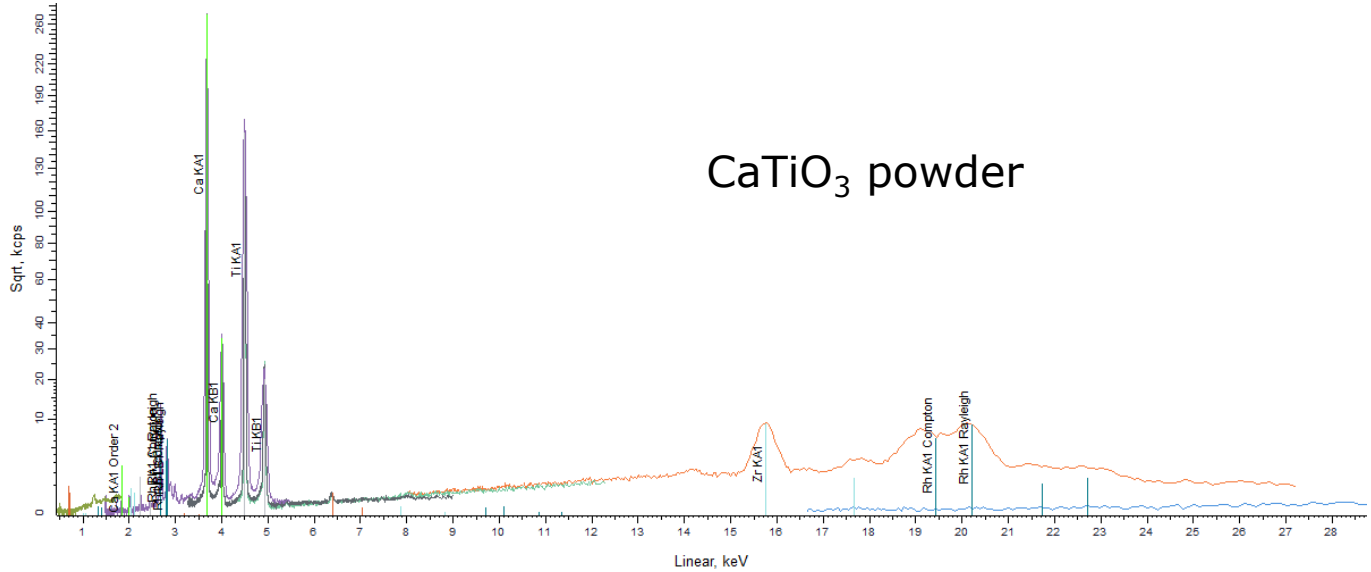
Calibrations

- Turnkey solutions: Quant Packages (GEO-QUANT)
- Custom calibrations
  - Well-defined customer standards and preferably certified reference materials
  - Routine measurements
- Standardless calibration SMART-QUANT WD
  - Material identification
  - Unknown / new samples
  - Contamination determination



SMART QUANT WD

- Measures scans so peak shifts, overlaps and different intensities (0-100%) can be handled by one solution
- Evaluation on integrated peaks → better counting statistics



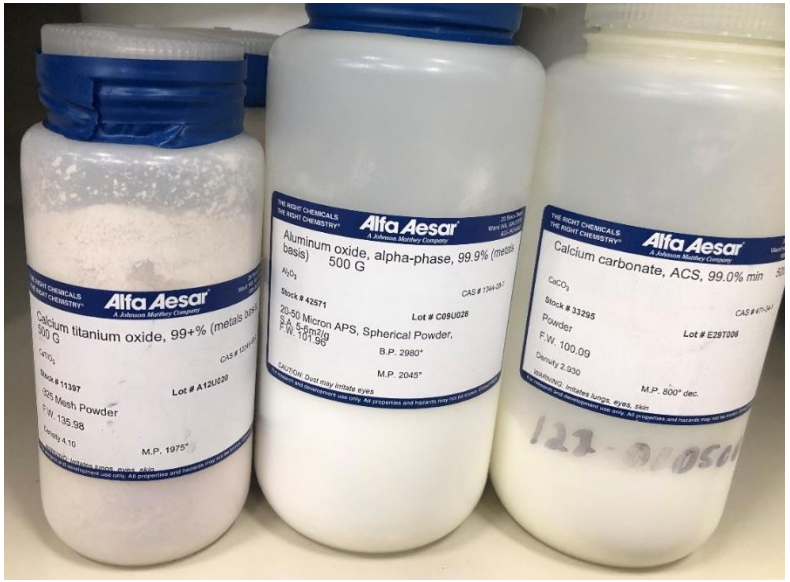
$CaTiO_3$ powder

Example $CaTiO_3$ (99% pure)

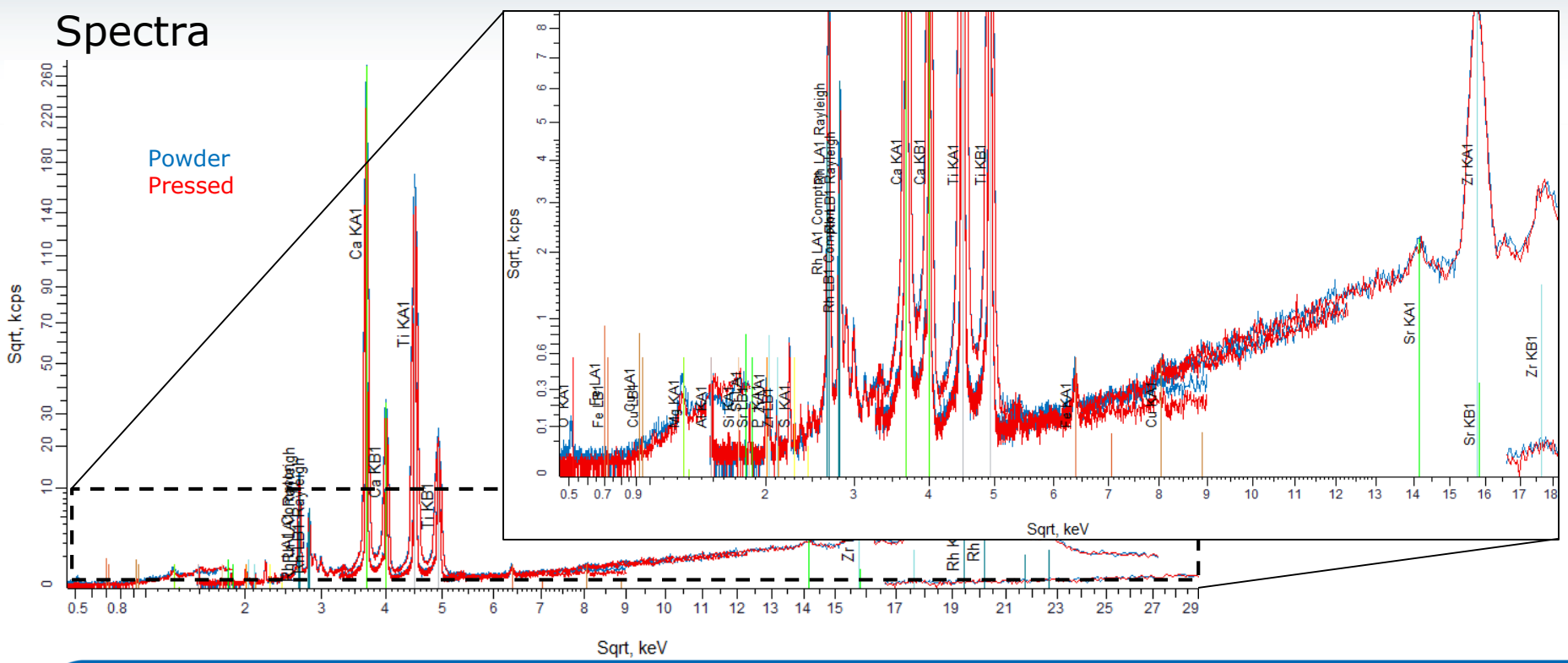
- Preparation:
  - Loose Powder
  - Pressed Pellet
- Evaluation:

	$CaTiO_3$ [%]	MgO [%]	Al_2O_3 [%]	SiO_2 [%]	P_2O_5 [%]	SO_3 [%]	K_2O [%]
Mea-sured	99.35	0.180	0.045	0.035	0.139	0.016	0.016

Cr_2O_3 [%]	Mn_2O_3 [%]	Fe_2O_3 [%]	CuO [%]	SrO [%]	ZrO_2 [%]	Nb_2O_5 [%]
0.009	0.006	0.028	0.012	0.010	0.147	0.004



Example $CaTiO_3$ (99% pure)



Soda Lime Glass

NIST certified standard SRM 621

	SiO_2 [%]	Na_2O [%]	CaO [%]	Al_2O_3 [%]	K_2O [%]	MgO [%]	SO_3 [%]	BaO [%]	Fe_2O_3 [%]	As_2O_3 [%]	TiO_2 [%]	ZrO_2 [%]
Cert	71.13	12.74	10.71	2.76	2.01	0.27	0.13	0.12	0.040	0.030	0.014	0.007
S6	71.19	13.13	10.18	2.34	1.90	0.21	0.14	0.11	0.051	0.032	0.000	0.008

National Bureau of Standards

Certificate

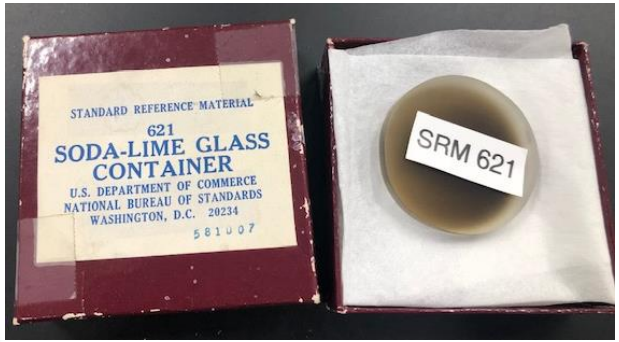
Standard Reference Material 621

Soda–Lime Container Glass

(In cooperation with the American Society for Testing and Materials)

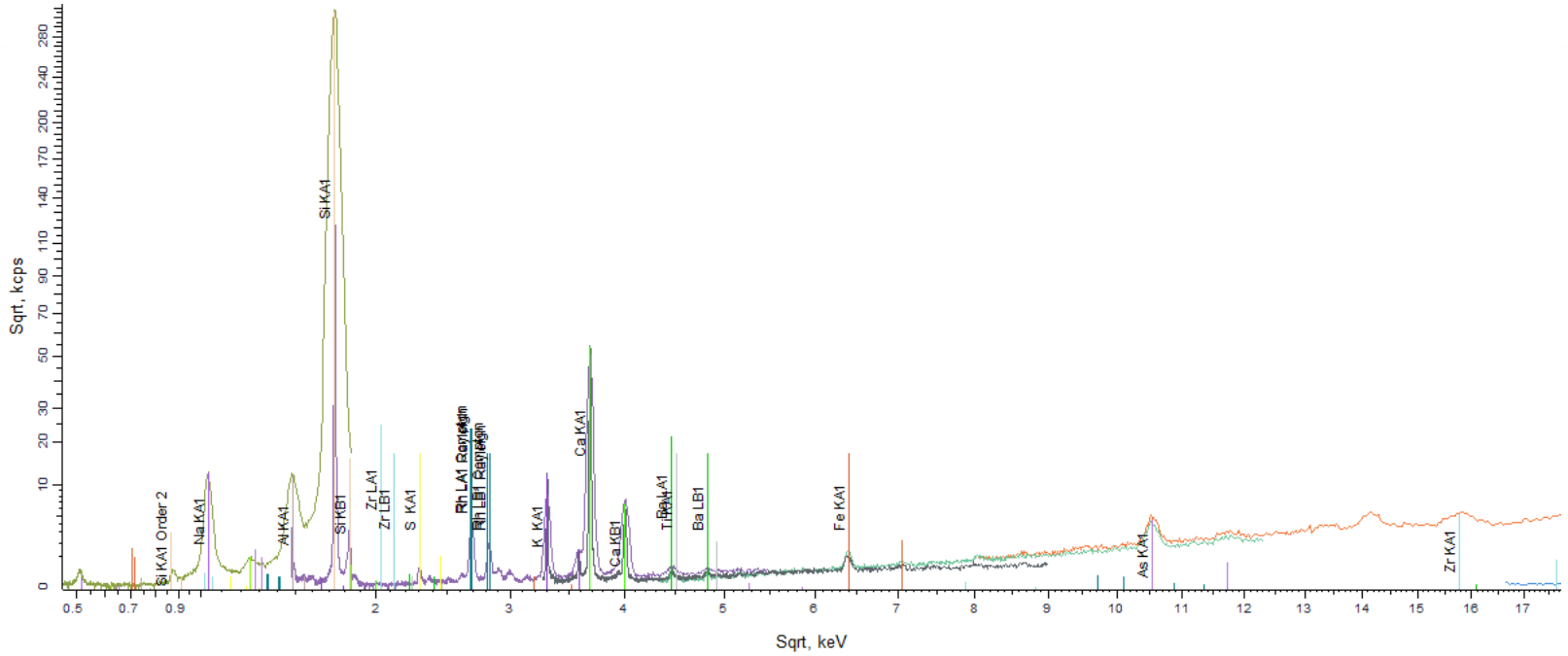
This Standard Reference Material is for use in checking chemical methods of analysis and for calibrating optical emission and x-ray spectrometric methods of analysis.

Constituent	Percent by weight	Uncertainty
SiO_2	71.13	0.03
Na_2O	12.74	0.05
CaO	10.71	0.05
Al_2O_3	2.76	0.04
K_2O	2.01	0.03
MgO	0.27	0.03
SO_3	0.13	0.02
BaO	0.12	0.05
Fe_2O_3	0.040	0.003
As_2O_3	0.030	0.001
TiO_2	0.014	0.003



Soda Lime Glass

NIST certified standard SRM 621



Q&A - XRF

Please type any questions you may have for Julia in the Q&A tool and click Submit.

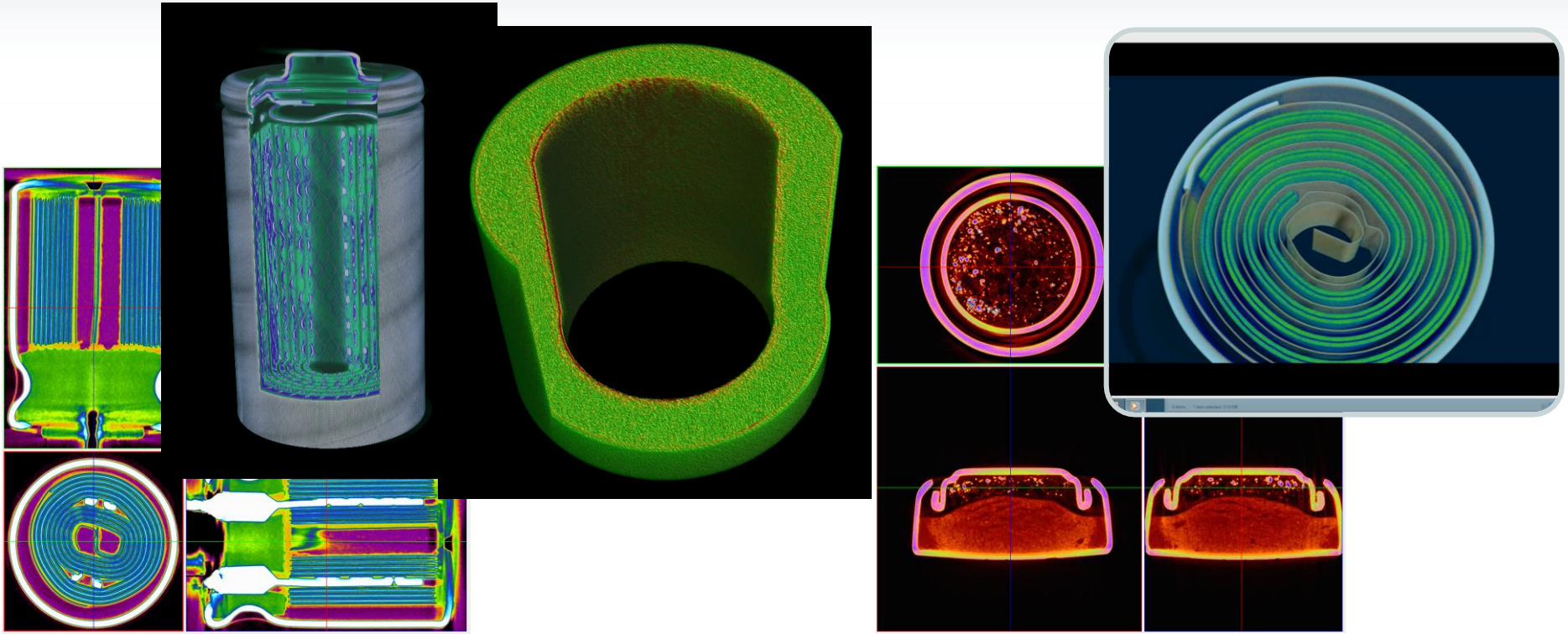
Julia Sedlmair, Ph.D.
Applications Scientist – XRF
julia.m.sedlmair@bruker.com

The S6 JAGUAR: A New Benchtop WDXRF Instrument with High Sensitivity

3D X-Ray Microscopy of Ceramics

David Sampson
Senior Sales Engineer – XRM

SKYSCAN
X-Ray Microscopes



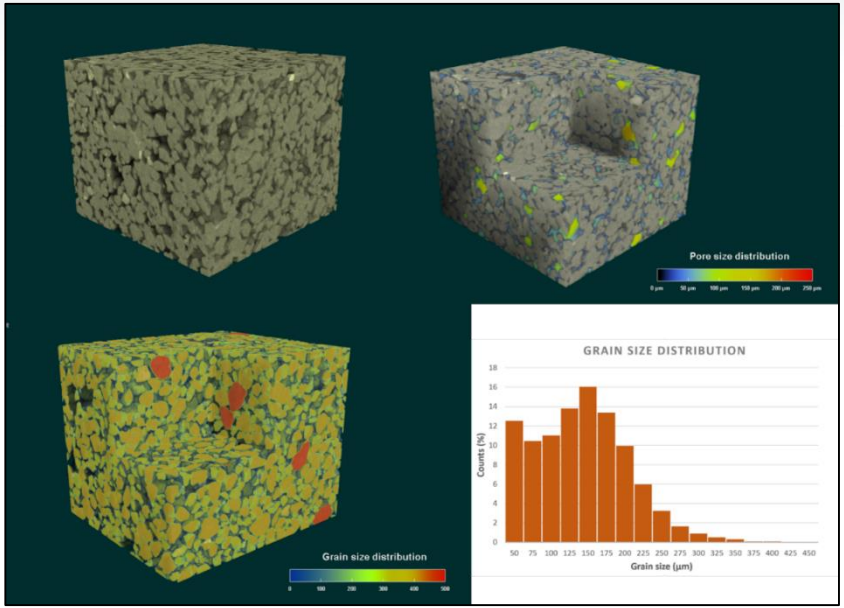
Bruker 3D XRM Solutions
Benchtop Portfolio

- High resolution
- 100 kV / 10 W
- High resolution 16 MP CCD (5000 x 2600 px)
- 0.35 micron minimum pixel size
- 75 mm scanning diameter
- Automatic filter changer
- Optional 16-position sample changer

- Automated – high throughput
- 100 kV / 10 W
- Fast 3 MP flat panel (2000 x 1500 px)
- 4 micron minimum pixel size
- 96 mm scanning diameter (1 FOV)
- Manual filter changer
- Optional 16-position sample changer
- Helical Scanning

- Larger, denser samples
- 130 kV / 39 W
- Fast, large area 6 MP flat panel (3072 x 1944 px)
- <3 micron minimum pixel size
- 250 mm scanning diameter
- Automatic filter change
- Helical & HART Plus Scanning

SKYSCAN
CTAn Analysis



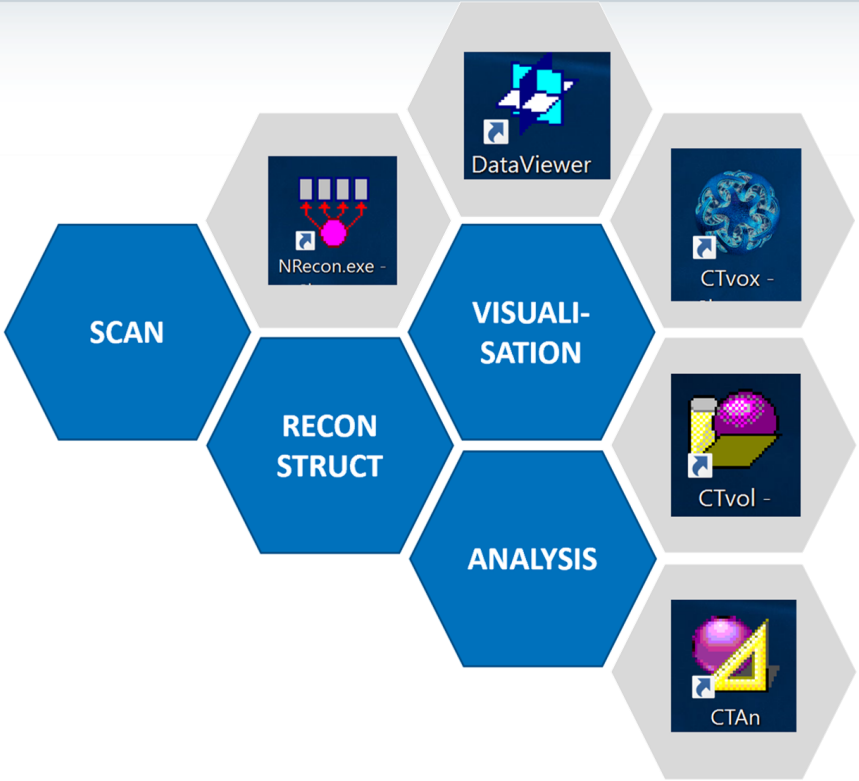
- 45 minutes scan time
- 5 µm voxel size
- Porosity and grain size analysis

Common Measurements

- Relative Density
- Vol. Quant
- Orientation
- Thickness
- Defects
- Size
- Shape
- Count
- Connectivity
- Relative Position

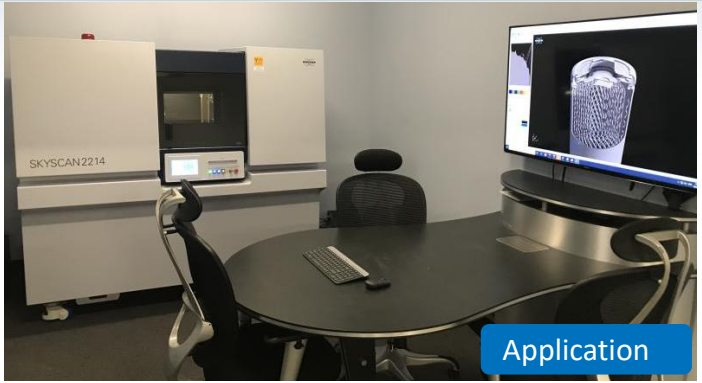
SKYSCAN
Included Software

Each and every SKYSCAN system comes with our comprehensive, in-house developed 3D.SUITE software for reconstruction, inspection, visualization, and analysis of the internal object structure.



Bruker AXS

North America Center of Excellence - Madison, WI



Q&A - XRM

Please type any questions you may have for David in the Q&A tool and click Submit.

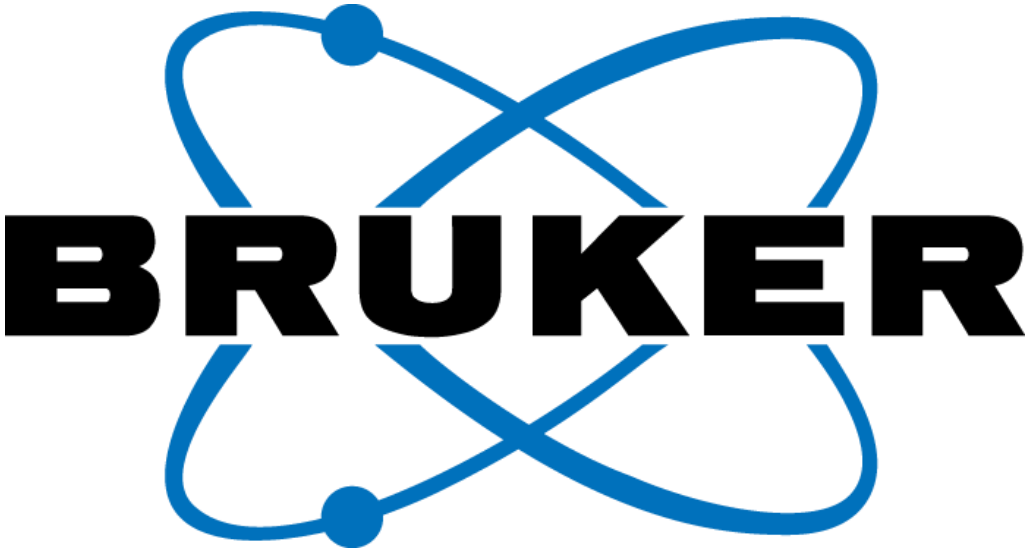
David Sampson
Senior Sales Engineer – XRM
david.sampson@bruker.com

3D X-Ray Microscopy of Ceramics

Thank you for attending!

Shawn O'Brien
Senior Sales Representative – XRF/XRD
shawn.obrien@bruker.com

- We will answer **remaining questions** individually via email
- You may schedule a follow-up meeting with me using our **Schedule a Meeting** tool
- Brochures, application notes and lab reports are available for download in our **Resource List**
- An **on-demand version** of this webcast will be available tomorrow at the same URL
- **Sign Up** for our other upcoming and on-demand webinars at **BAXS Virtual Events 2020**
- Fill out our **exit survey** to let us know how we did



Innovation with Integrity