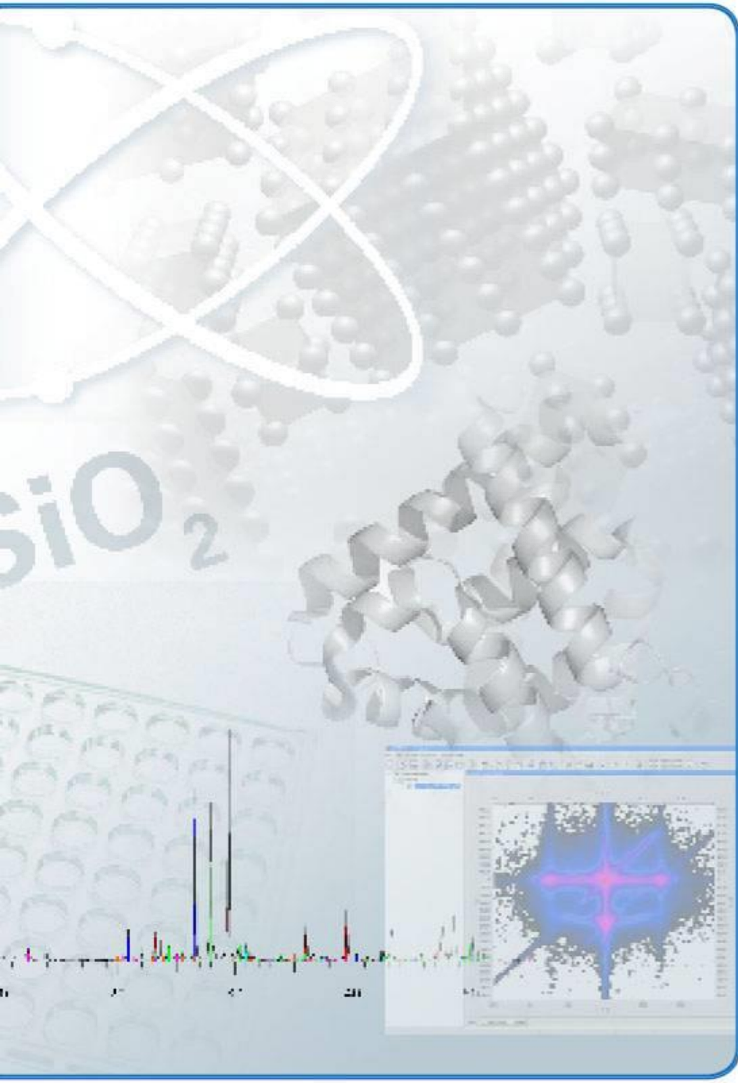

The New D8 ADVANCE DAVINCI.DESIGN

布鲁克D8 ADVANCE达芬奇衍射仪简介

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13918099196;
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Bruker AXS GMBH SHANGHAI

市场情况：
1997年起，超过900台D8衍射仪在中国安装

BRUKER

清華大學 Tsinghua University

北京大學 PEKING UNIVERSITY

FUDAN UNIVERSITY 1905

山东大学 SHANDONG UNIVERSITY

IMR

南京大學

上海交通大學 SHANGHAI JIAO TONG UNIVERSITY

同濟大學 TONGJI UNIVERSITY

中山大學 SUN YAT-SEN UNIVERSITY

中国科学院物理研究所 INSTITUTE OF PHYSICS CHINESE ACADEMY OF SCIENCES

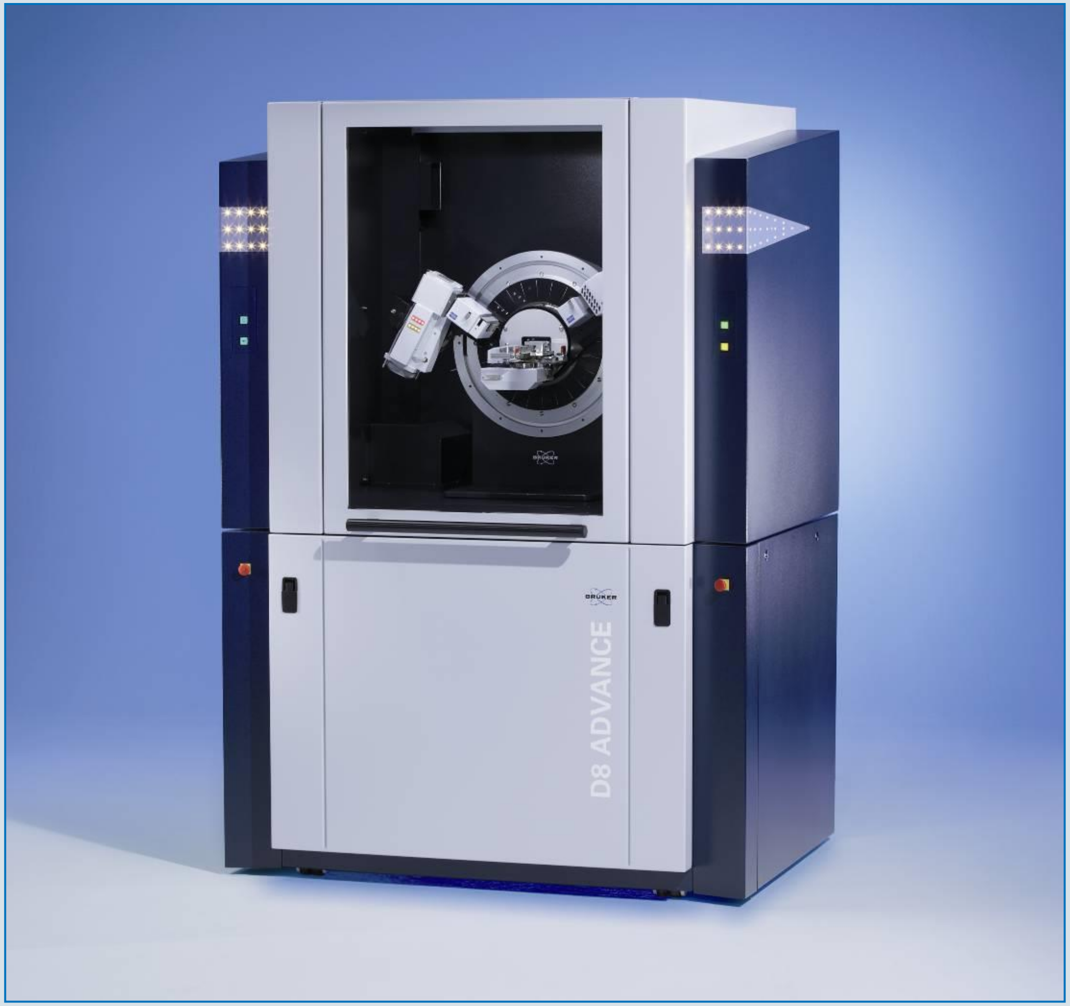
華南理工大學

武漢大學 WUHAN UNIVERSITY

SICCAS Since 1928 中国科学院上海硅酸盐研究所 Shanghai Institute of Ceramics, Chinese Academy of Sciences

≥ 900 Systems installed in china from 1997

The New D8 ADVANCE
开创XRD的新世纪



The New D8 ADVANCE
Designed for the New Era in XRD

老D8 ADVANCE

新New D8 ADVANCE

The New D8 ADVANCE
全球创新智能衍射仪系统

The New D8 ADVANCE -
The world's 1st truly all-purpose diffractometer for everyone

- True plug & play functionality with fully automatic component recognition and configuration
- Uncompromised and alignment-free switch of configurations – whatever your sample, whatever your application
- Absolutely open design with maximum flexibility for future adaptations, coupled with maximum user-friendliness, operating convenience and safe handling

The New D8 ADVANCE
全新智能化设计

DAVINCI.DESIGN: A revolutionary 3-level design

1.DAVINCI.MODE
元器件自动识别

2.DAVINCI.SNAP-LOCK
无工具元器件互换

3.DIFFRAC.DAVINCI
虚拟测角仪技术

The New D8 ADVANCE
DAVINCI.**MODE** 达芬奇模块

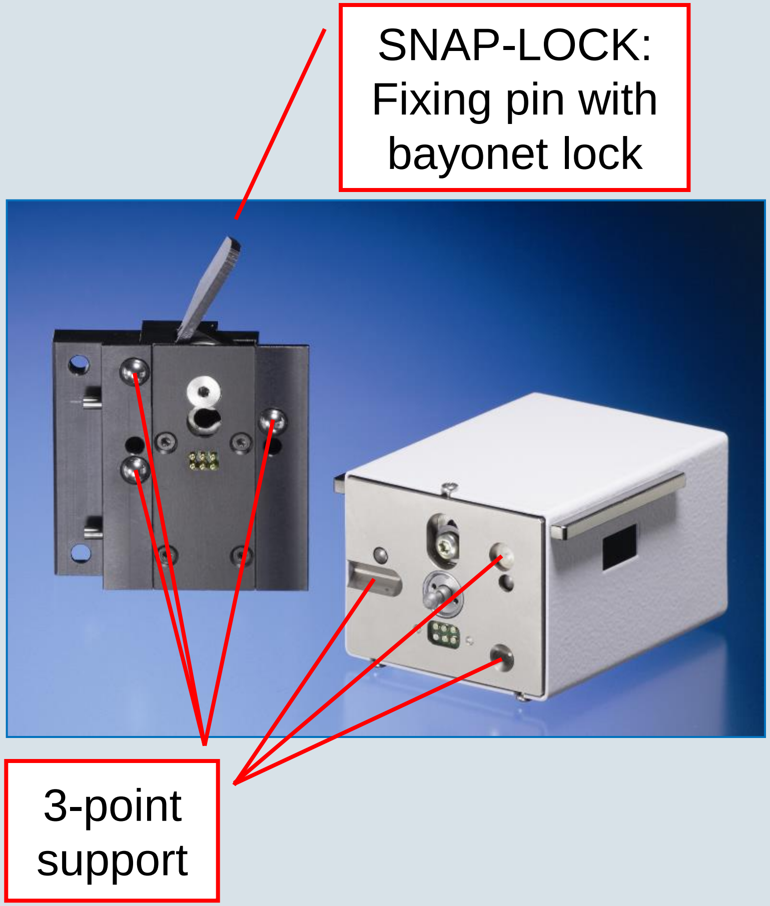
DAVINCI.MODE
=
Component Recognition

- 所有光学部件实现全自动实时识别
  - 每一个附件（狭缝及滤片外）拥有独特的ID识别码
  - 狭缝及滤片通过类似光栅技术进行识别
- 真正的即插即用功能

The New D8 ADVANCE
DAVINCI.SNAP-LOCK 无工具安装弹簧锁

DAVINCI.SNAP-LOCK
=
Tool-free Change of Optics

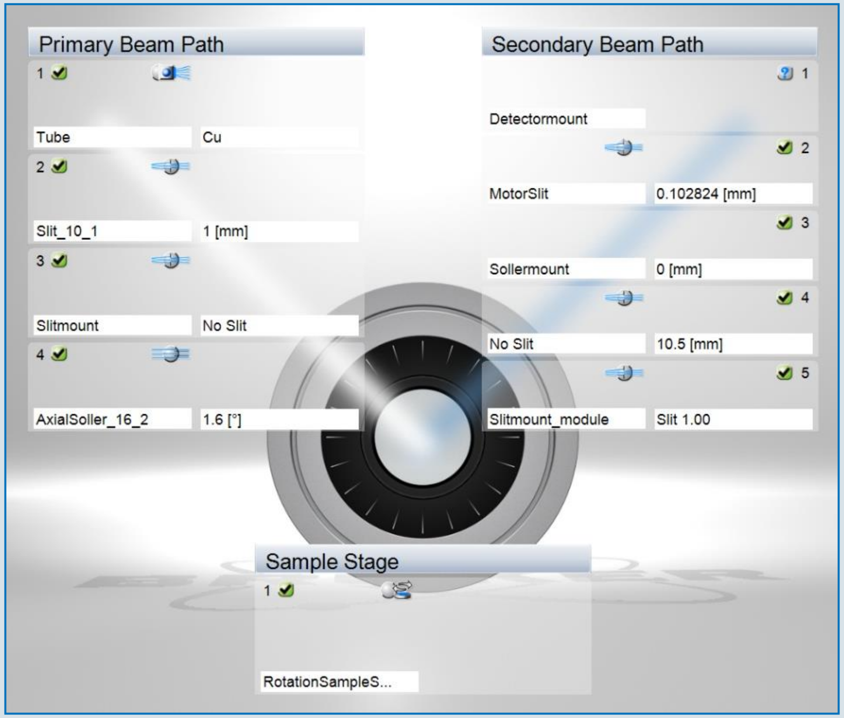
- High precision snap-lock mechanism: Tool-free change of optics in a second
- High-precision pre-alignment to optics mount with 3-point support



The New D8 ADVANCE
DIFFRAC.DAVINCI 智能硬件控制面板

DIFFRAC.DAVINCI
=
The Virtual Goniometer

- Graphical representation of the actual goniometer showing all mounted components plus their status
- Software validated instrument configuration with real-time conflict detection



The New D8 ADVANCE
with DAVINCI.DESIGN 全智能化

DAVINCI.DESIGN: A revolutionary 3-level design

1.DAVINCI.MODE
Component Recognition

Intuitive - fail-safe - child's play

Tool-free Change of Optics

3.DIFFRAC.DAVINCI
The Virtual Goniometer

The New D8 ADVANCE& D8 DISCOVER
Unique Selling Propositions (独特技术）

General
- DAVINCI.MODE - Component Recognition （组件自动智能识别）
- DAVINCI.SNAP-LOCK - Tool-free Change of Optics （免工具安装附件）
- DIFFRAC.DAVINCI - The Virtual Goniometer （虚拟测角仪，全智能控制面板）

Instrument Specs
- TWIN Optics （双光路设计,全智能切换）
- TWIST Tube （双焦斑设计 陶瓷光管）

Good Diffraction Practice
- Safety Assurance （全球最高辐射安全标准）
- Alignment Guarantee：better than ±0.01° 2Theta （角度精度优于0.01° 2theta ）
- Long-Life X-ray Tube (长寿命陶瓷X射线光管）
- Detector： Guarantee （领先两代独家林克斯能量色散阵列探测器）
- TOPAS SW （基本参数法全谱拟合软件）

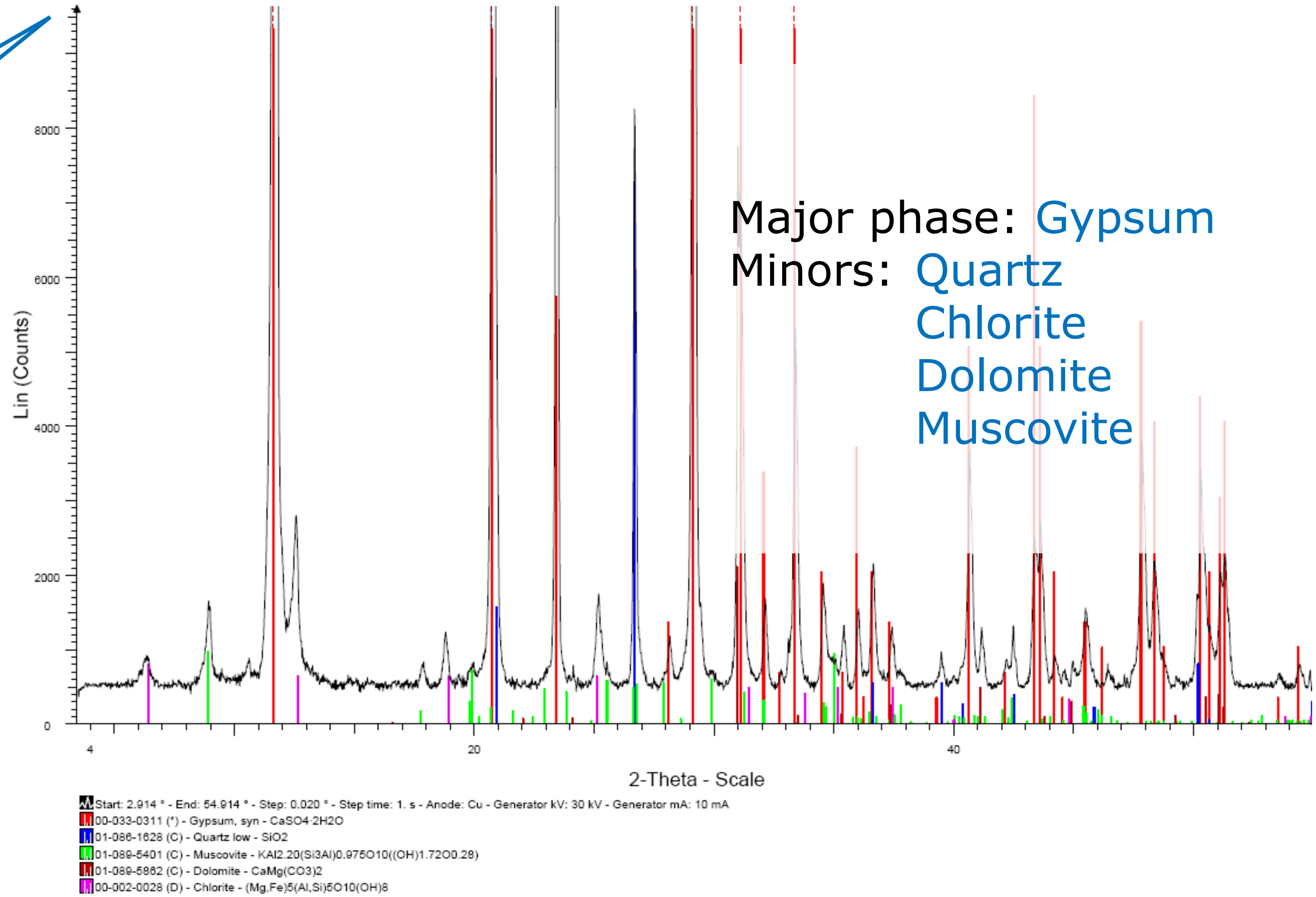
New D8 ADVANCE
主要应用

- Phase identification and quantitative phase analysis（定性与定量分析）
- Ab-initio crystal structure determination and refinement（粉末数据解结构与结构精修）
- Micro-structure analysis (crystallite size, microstrain, ...)（微观应力、晶粒大小）
- Residual stress analysis （残余应力分析）
- Thin film analysis (reflectometry) （薄膜反射率分析：厚度、密度、粗燥度）
- Grazing incidence diffraction (GID)（薄膜掠入射分析：物相、次序、取向...)
- Small angle X-ray scattering (SAXS)(小角散射分析）
- Pair distribution function analysis (PDF)（对分布函数分析）
- Texture analysis （织构分析）
- Micro-Diffraction （微区分析）
- XRD measurements at non-ambient conditions (low- and high temperatures, variable humidity)（原位分析）

主要应用一：物相鉴定

Geological sample / construction material

Scale: 10% max. intensity



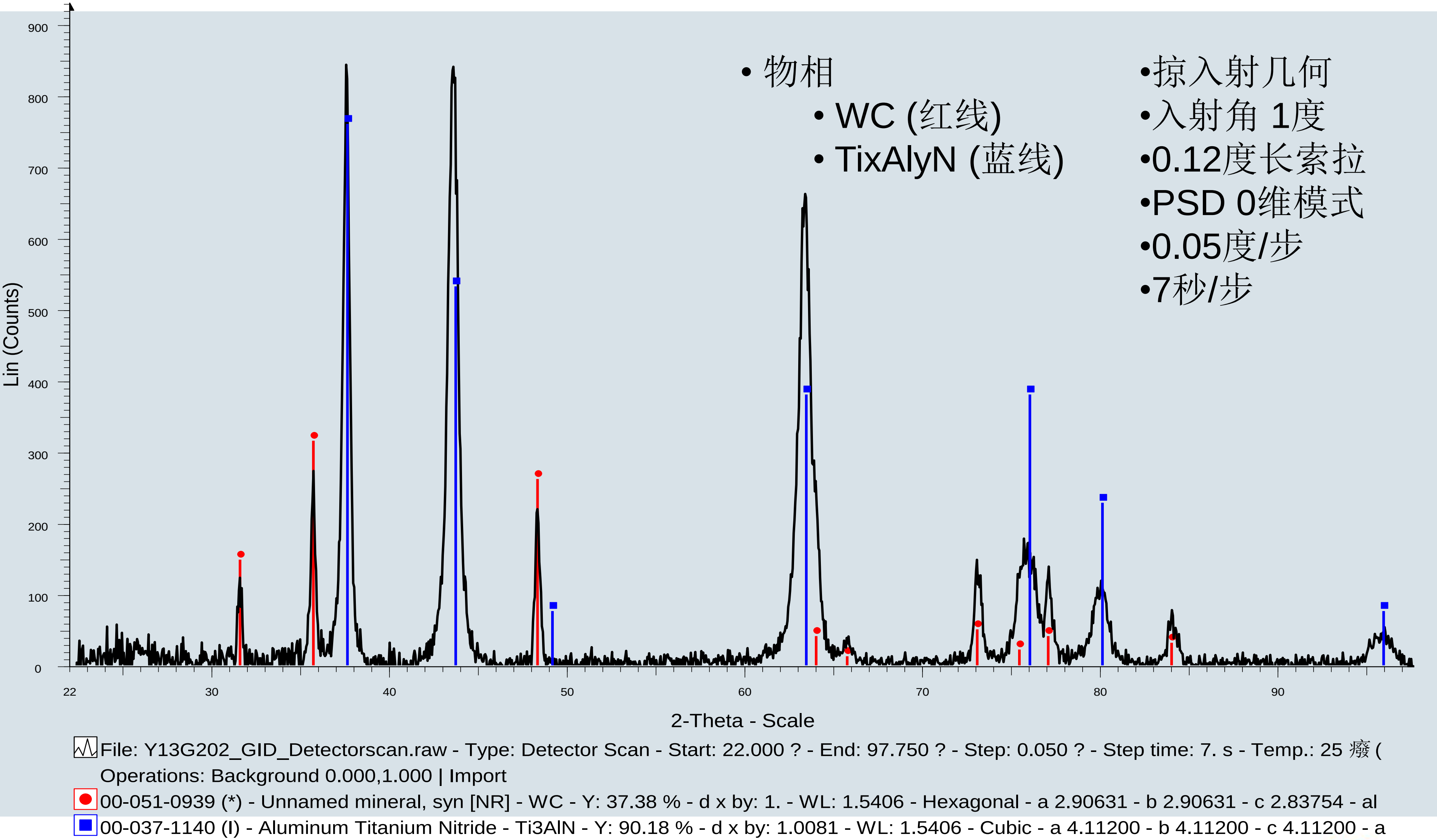
Scan parameters:

- LYNXEYE
- 3-60 ° 2Theta
- Step size 0.02°
- 0.1 sec/step
- Total 5 min

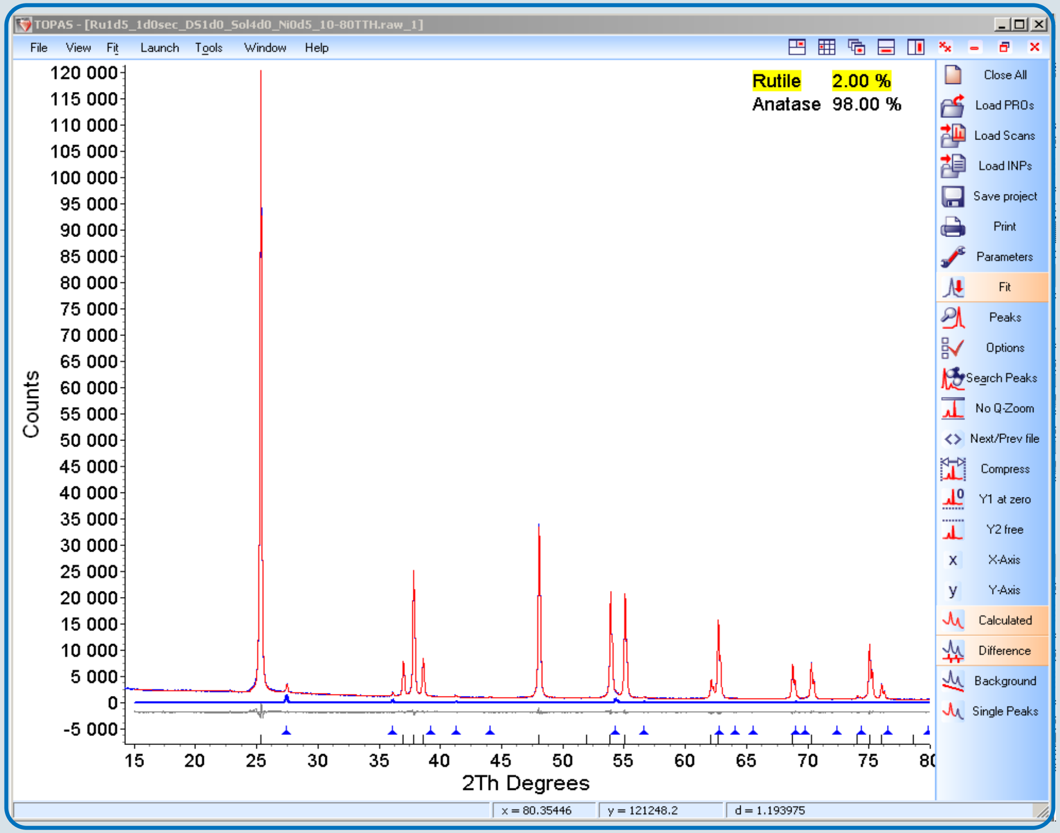
主要应用一：物相鉴定：涂层XRD 物相图谱

- 物相
  - WC (红线)
  - TixAlyN (蓝线)

- 掠入射几何
- 入射角 1度
- 0.12度长索拉
- PSD 0维模式
- 0.05度/步
- 7秒/步



主要应用二：定量分析（包括无标样）
TiO_2 Rutile/Anatase - TOPAS



Application

- White Pigments – detection of detrimental modifications
- Request > 0.5 % Rutile
- Simple quantifications
  Esd ~ 0.02 … 0.1 wt-%

Scan parameters

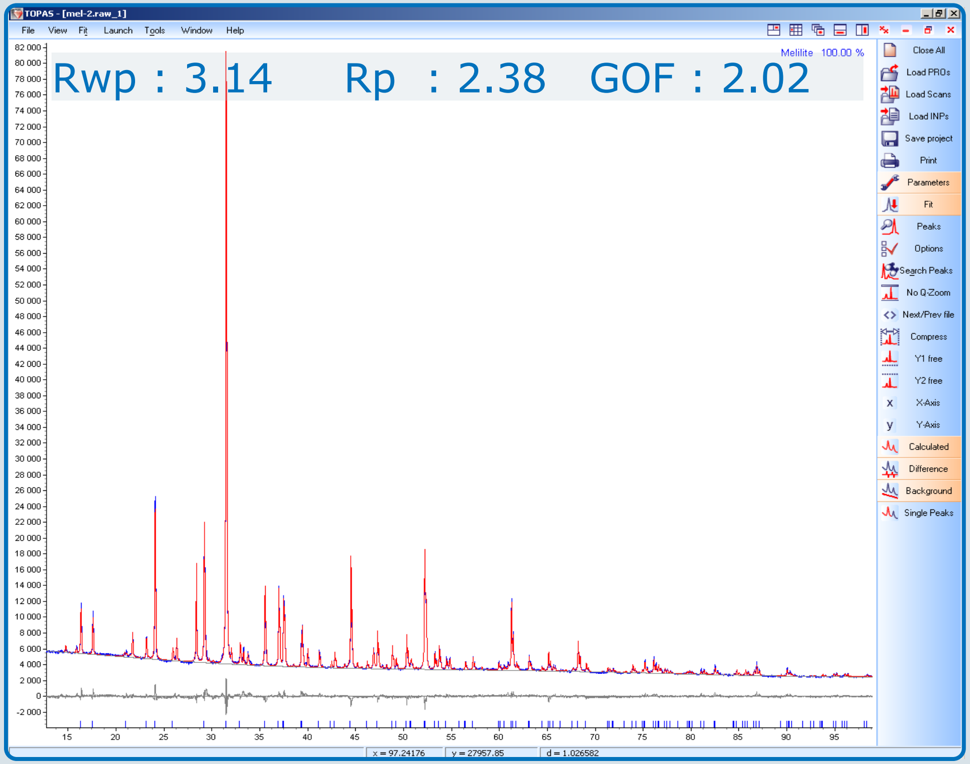
- LYNXEYE
- 10-80 ° 2θ
- Step size 0.02°

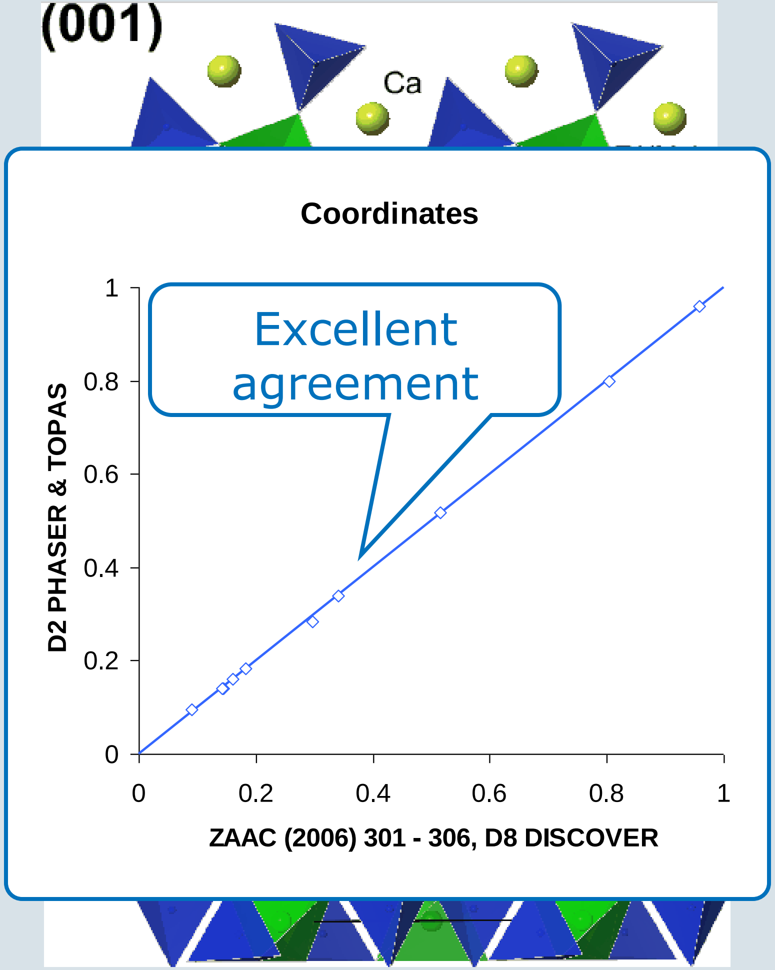
< 2% 0.1sec/step- total 5 min

> 2% 0.05 sec/step – total 2 min

主要应用三：结构精修与解结构

6 atoms refined + thermal parameters

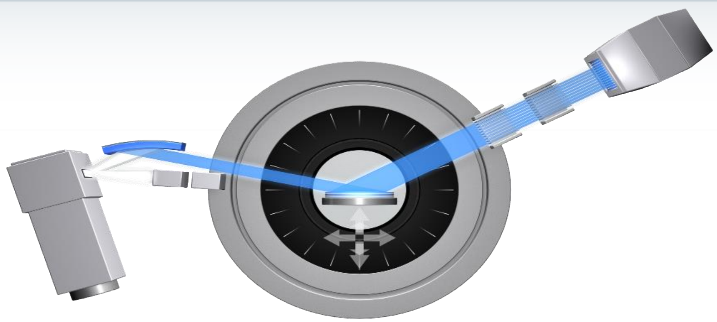


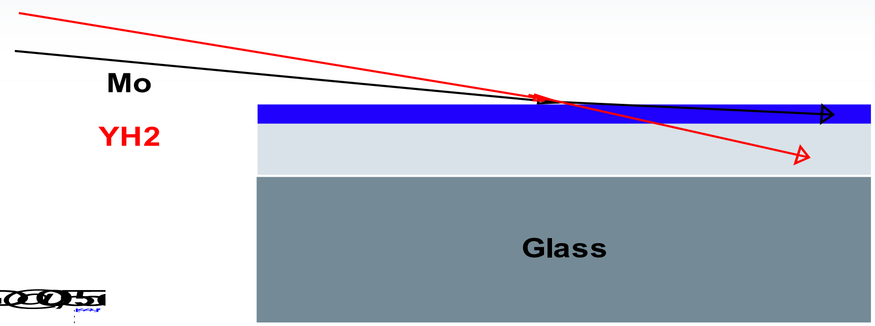


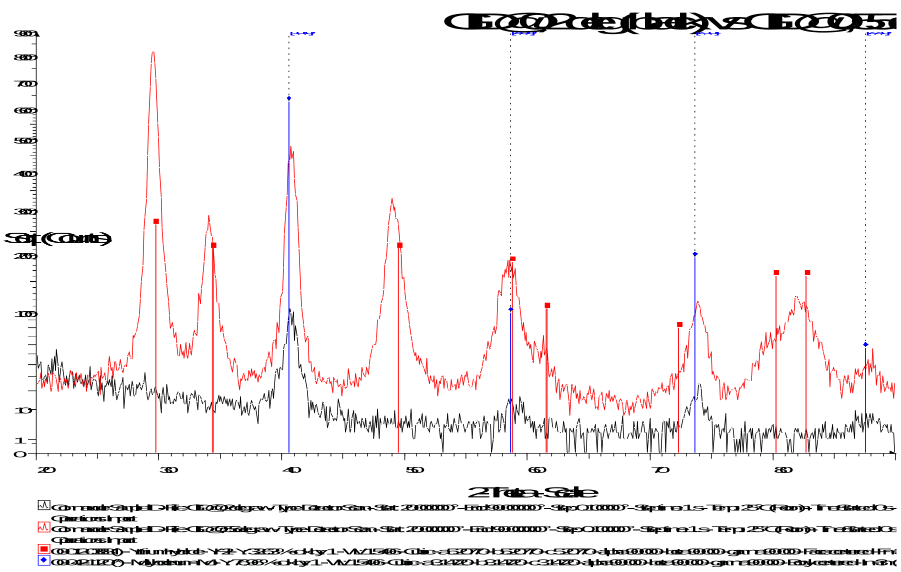
Er-Melilite: $Er_x\ Ca_{2-x}\ Al[\ Al_{2-x}\ Si_x\ ]O_8$

主要应用四：薄膜掠射分析

Grazing incidence diffraction
Phase ID depth profile



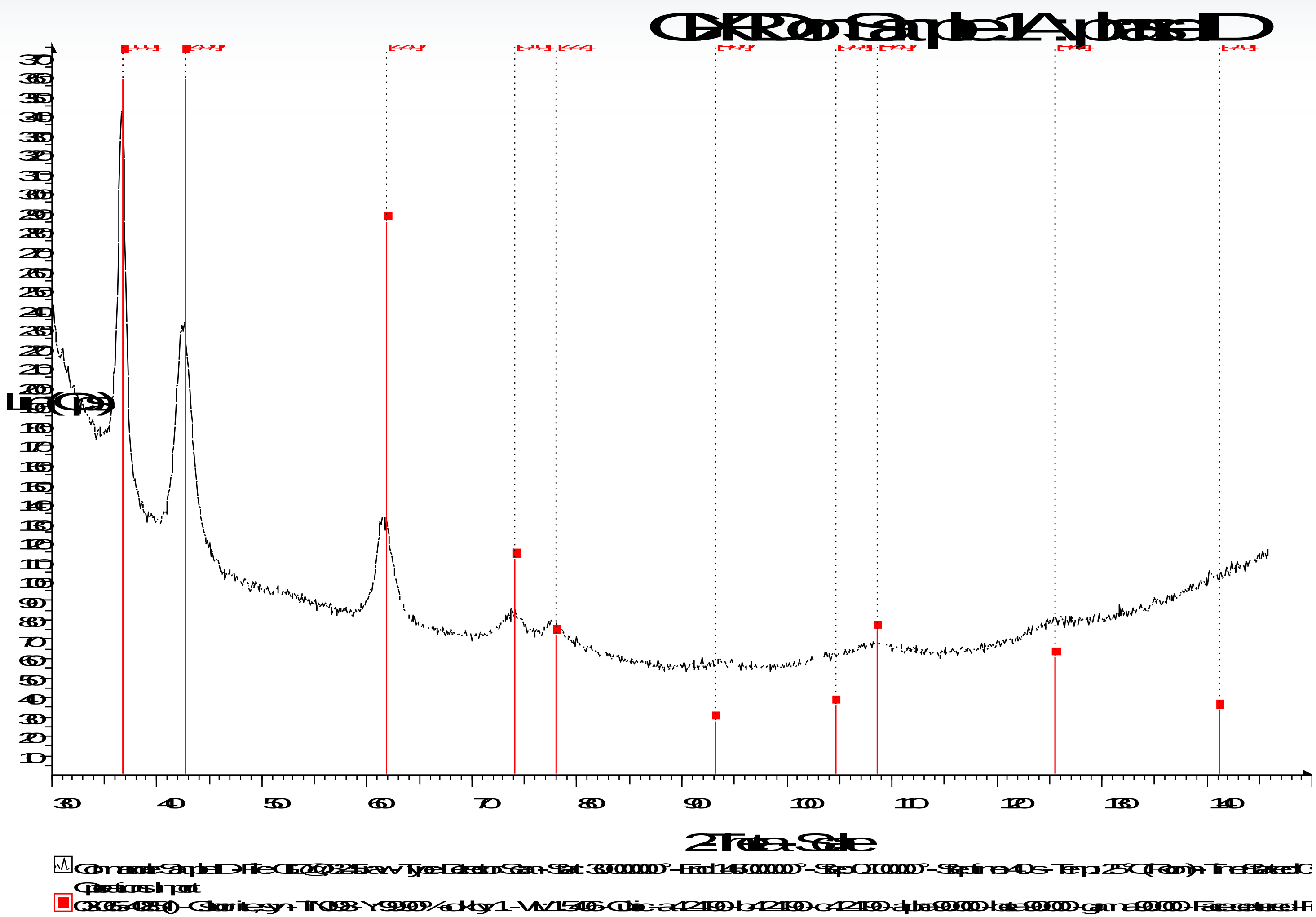




At 0,2 deg incident angle, only Mo layer is detected.

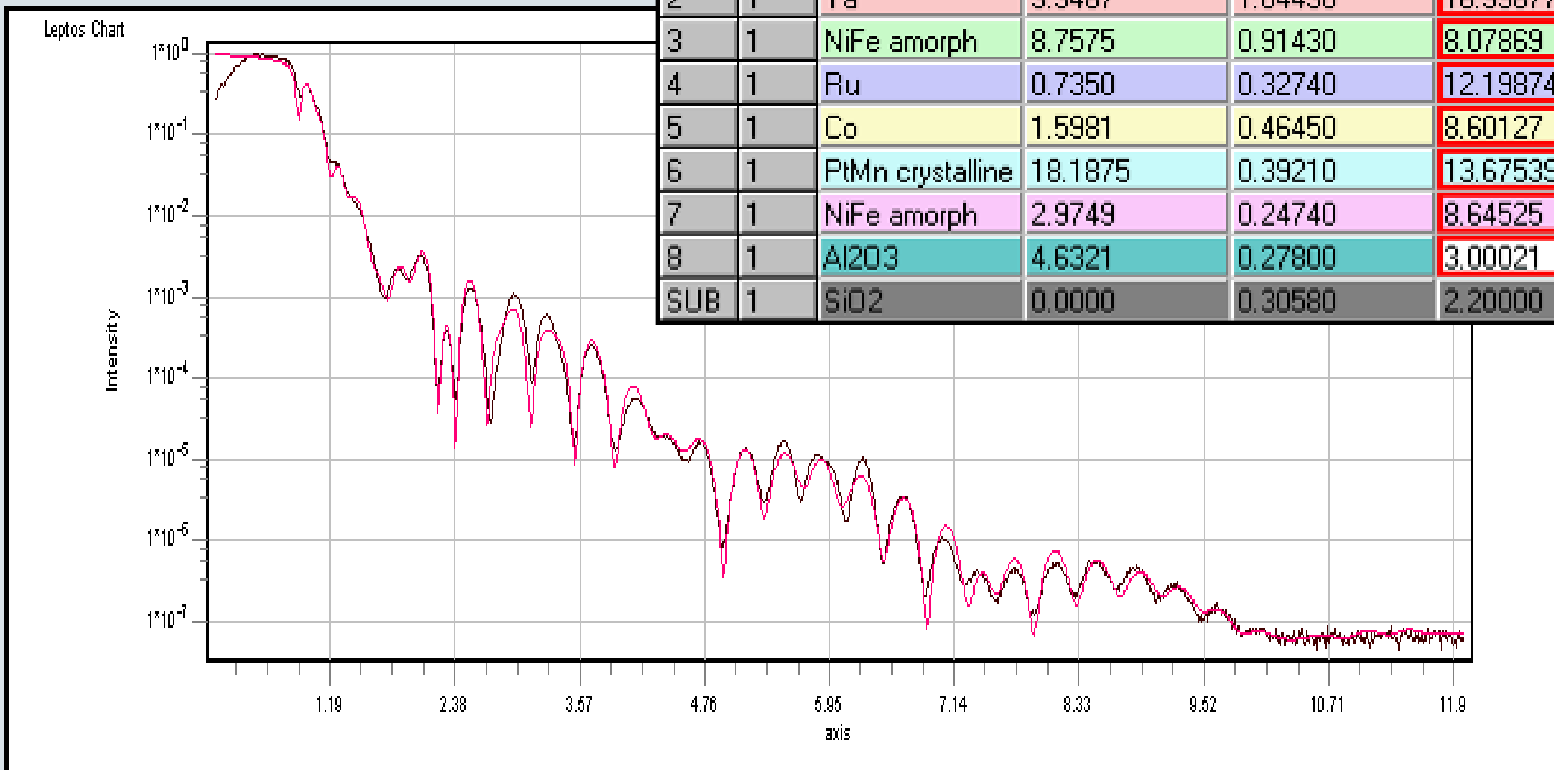
At higher incident angle, the YH2 layer is reach and starts to diffract.

Residual stress analysis on thin films
GIXRD scan on a 25 nm TiN layer
Perfect match with Osbornite (cubic TiN)



主要应用四：薄膜反射率分析（厚度、密度、粗燥度）
XRR:GMR Heterostructure – 8 Layers

N	R	Material	Thickness	Roughness	Density T
1	1	Ta2O5	3.2159	0.84140	7.43604
2	1	Ta	3.3487	1.04430	16.99877
3	1	NiFe amorph	8.7575	0.91430	8.07869
4	1	Ru	0.7350	0.32740	12.19874
5	1	Co	1.5981	0.46450	8.60127
6	1	PtMn crystalline	18.1875	0.39210	13.67539
7	1	NiFe amorph	2.9749	0.24740	8.64525
8	1	Al2O3	4.6321	0.27800	3.00021
SUB	1	SiO2	0.0000	0.30580	2.20000



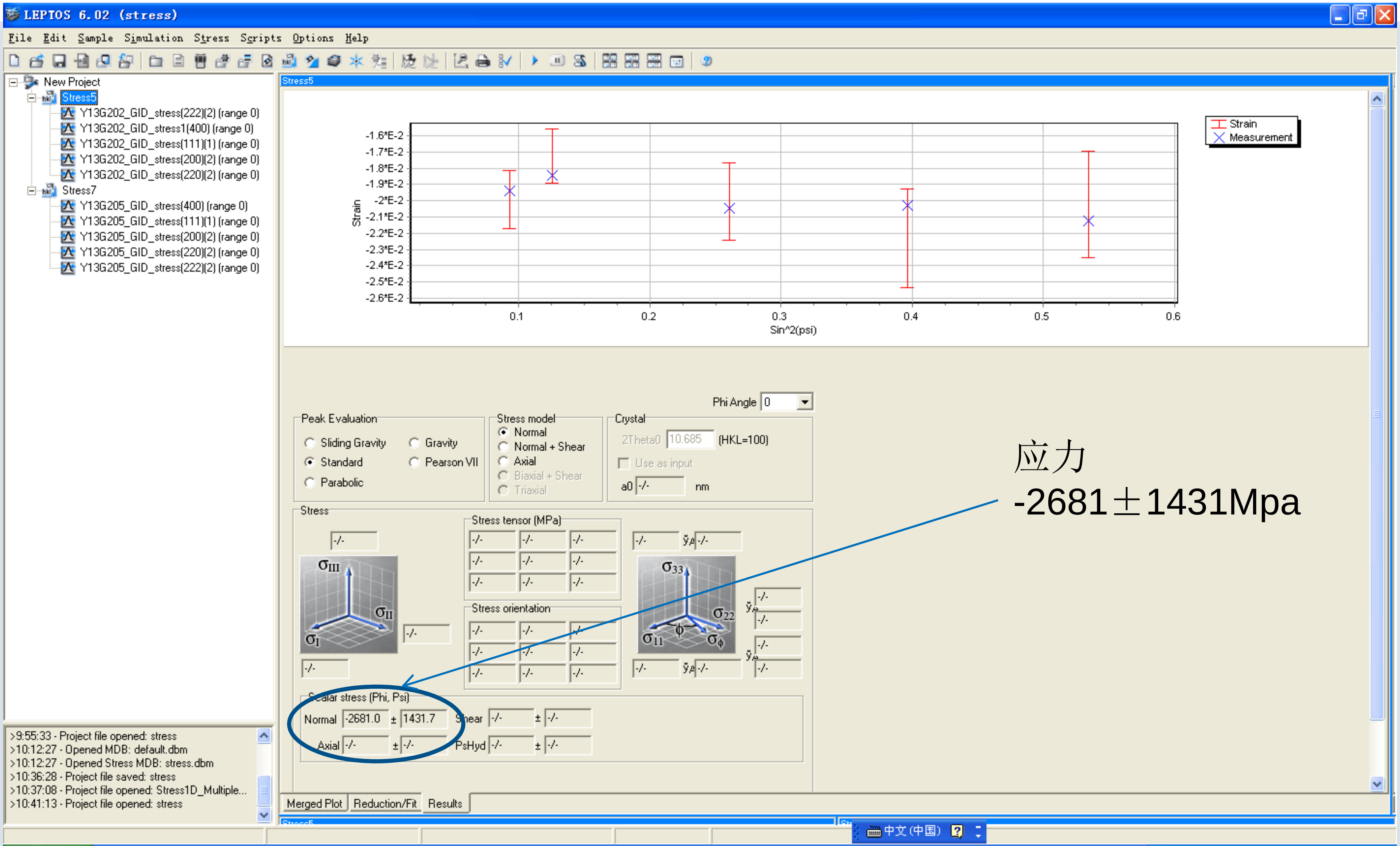
Sample courtesy of Dr. Schug, IBM Mainz

主要应用五：应力测试：TiAlN镀层应力测量

▪应力测量方法
  ▪ 多个衍射面 (Multi-HKL)
  测量计算方法, 适合薄膜及镀层材料的应力分析。
  •TixAlyN （111），（200），（220），（222），（400）
  五个衍射峰.
  •分段测量以缩短测量时间

•测量条件
  •掠入射几何
  •入射角 1度
  •0.12度长索拉
  •PSD 0维模式
  •0.05度/步
  •25秒/步

TiAlN镀层测量应力分析



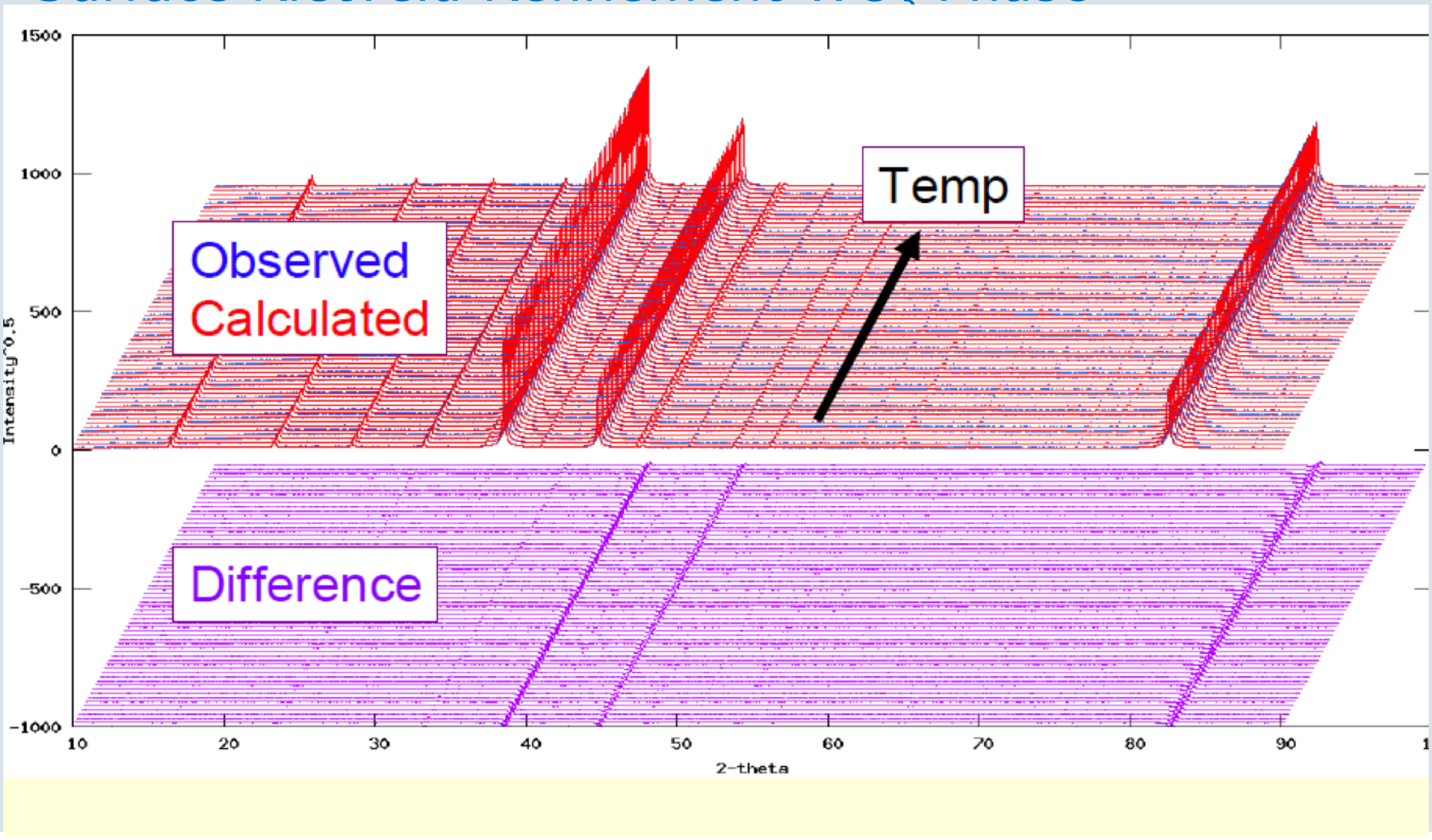
应力

-2681±1431Mpa

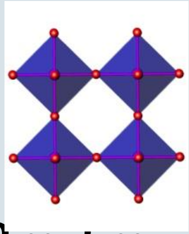
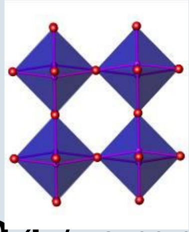
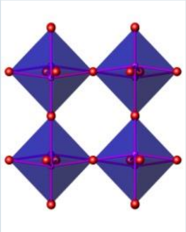
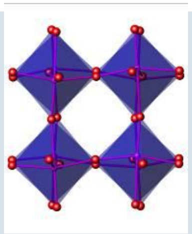
主要应用六：变温分析

Typical Application

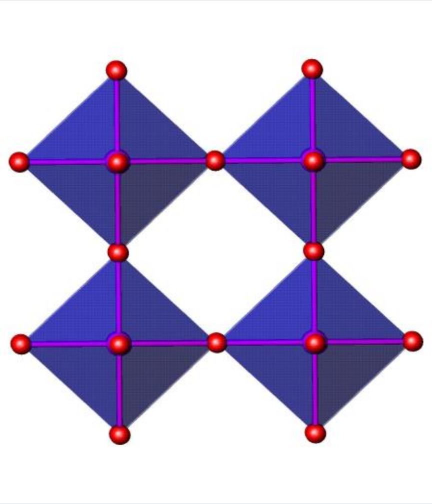
Surface Rietveld Refinement WO_3 Phase



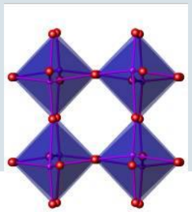
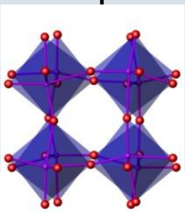
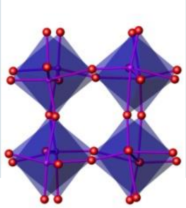
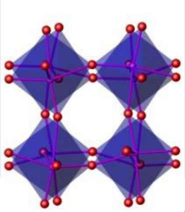
WO_3 Phase Transitions

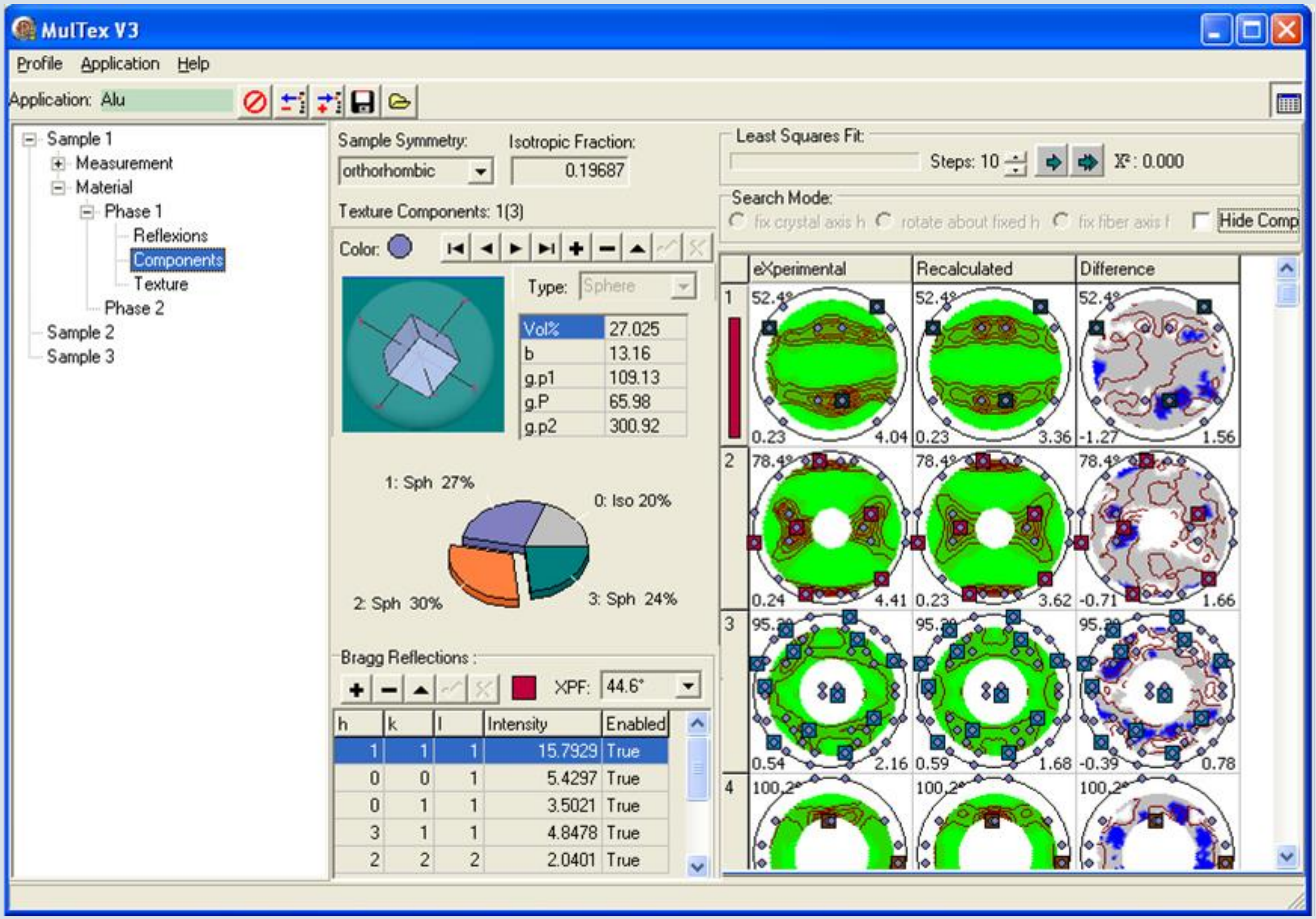
$$Pm3m \xrightarrow{??K} P4/nmm \xrightarrow{1173K} P4/ncc \xrightarrow{1073K} P2_1/c$$



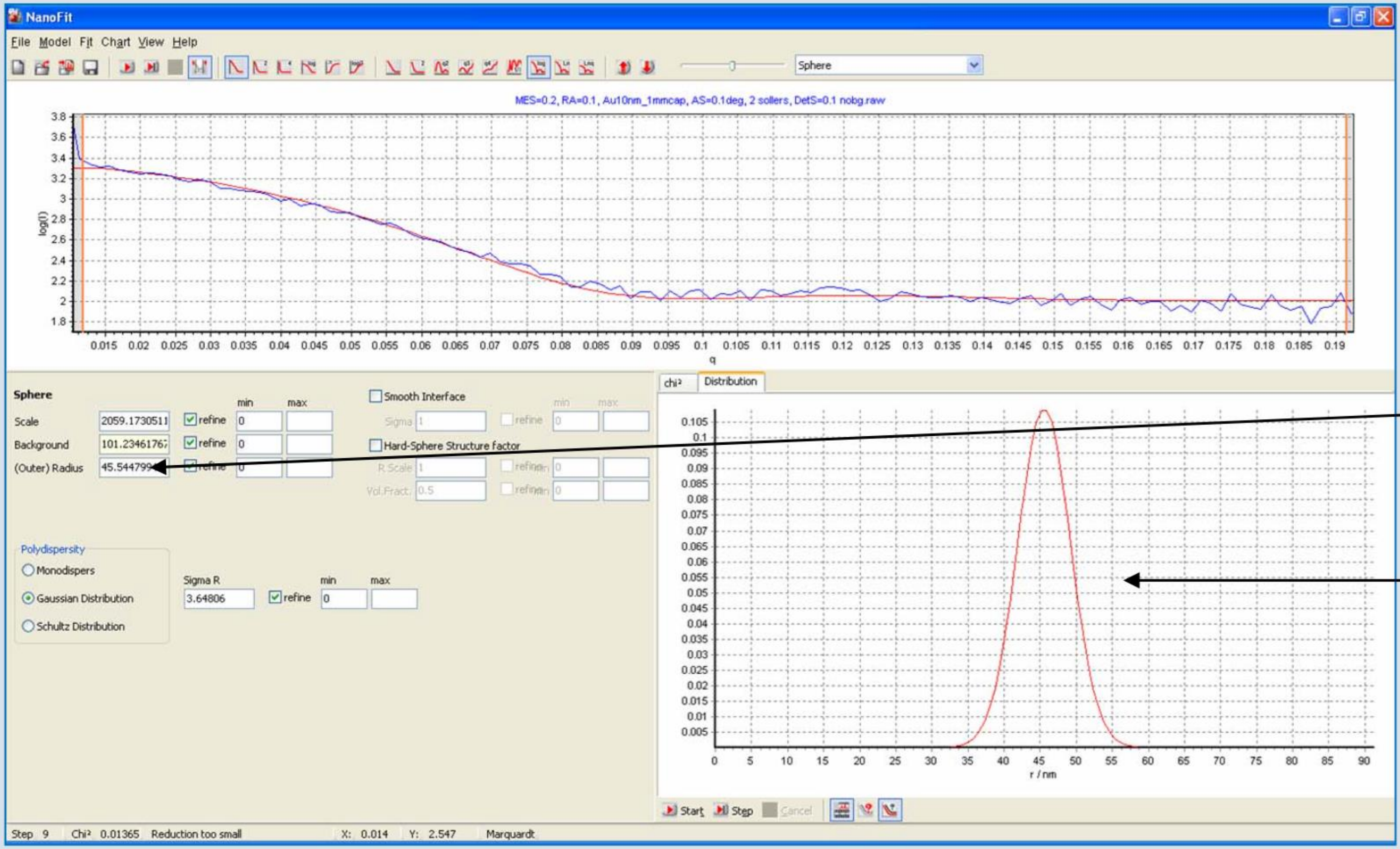
$$\xrightarrow{993K} Pbcn \xrightarrow{623K} P2_1/n \xrightarrow{\sim 290K} P\bar{1} \xrightarrow{\sim 230K} Pc$$

主要应用七：织构分析Texture



主要应用八：小角散射分析

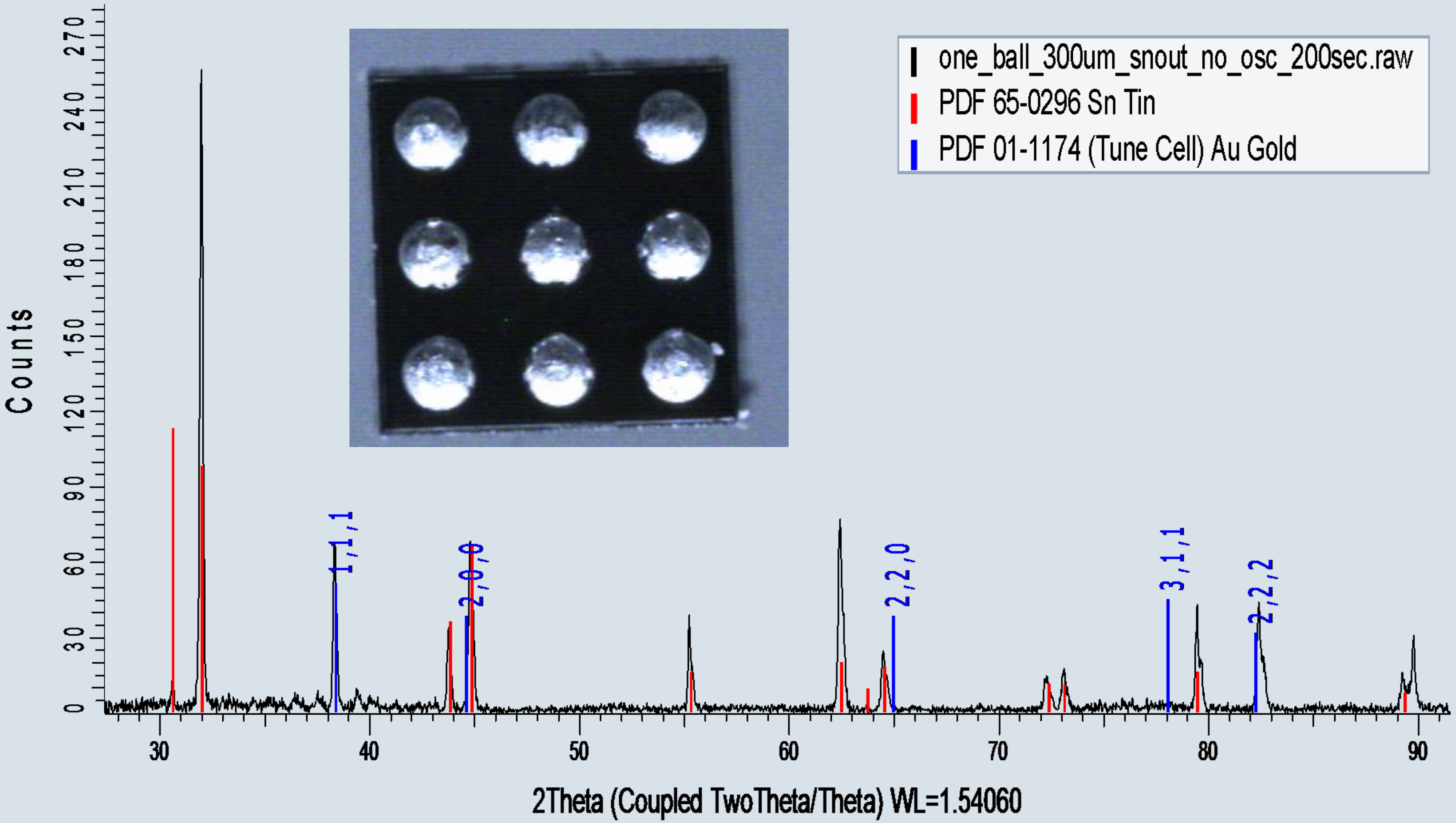


- Background corrected SAXS (blue) and fitted SAXS (red)
- Fitting results:

Mean sphere radius = 45.54 Å

Size distribution modeled by a Gaussian distribution with sigma = 3.65 Å

主要应用九:微区分析 100微米焊点



主要应用十：PDF分析Determination of Pair Distribution Functions (PDF)

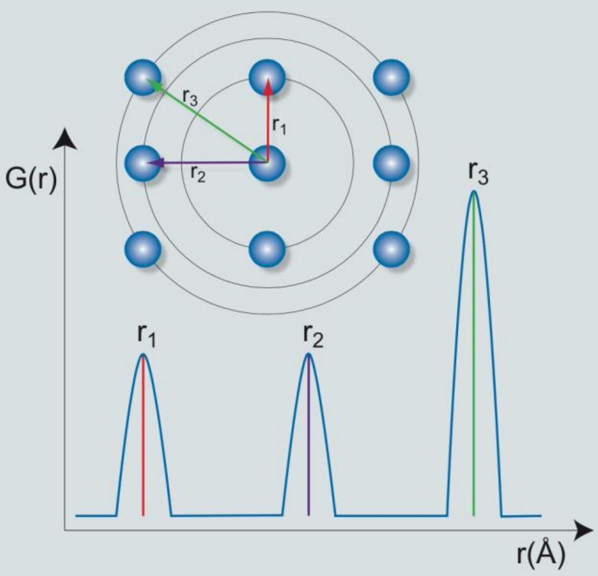


Figure 1: Principle of the PDF. Inter-atomic distances r_i cause maxima in the PDF G(r). The area below the peaks correspond to the number of neighbors, scaled by the scattering power of the respective atoms

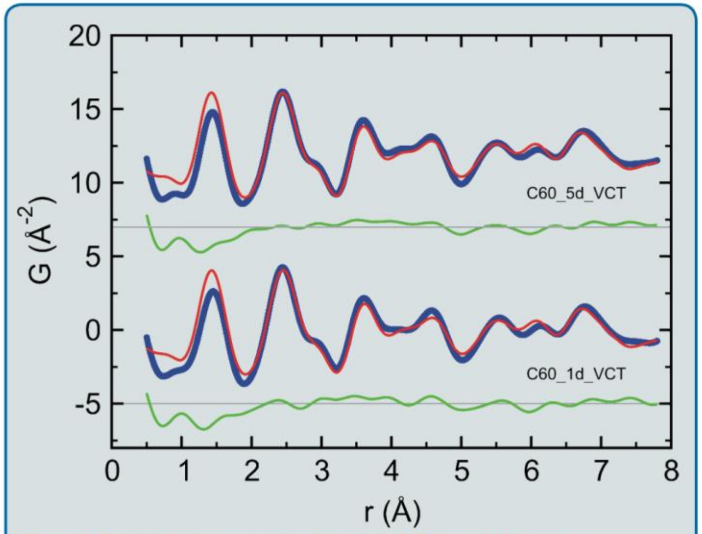


Figure 5: Fit of two experimental PDFs with room temperature structure data of Buckminster fullerene C_{60}.

PDFfit results are given in Figure 5. The experimental data (collected with different measurement times, blue curves) are modelled (red curves) based on the known structure of the high-temperature form of C_{60}. The difference curves (green) show a good agreement between experiment and theory.

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