



NanoLab Delivers!

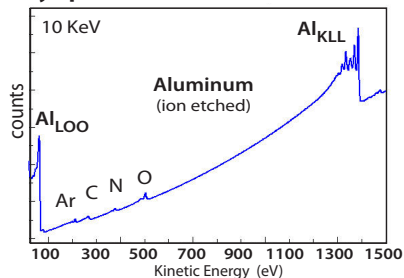
Analytical Services On Demand

'FE-AES'
Your 20 nm
Chemical State
Information Tool

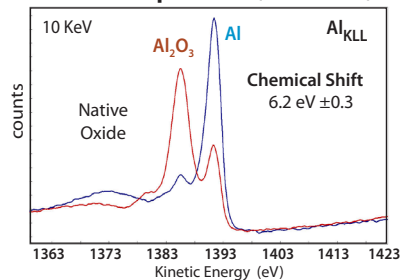
NanoLab's State-of-the-Art 'FE-AES'



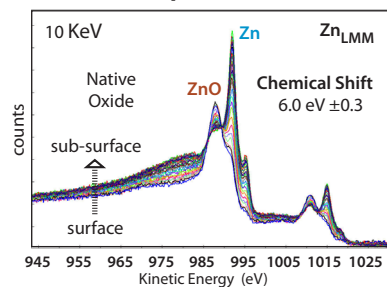
Survey Spectrum (all elements)



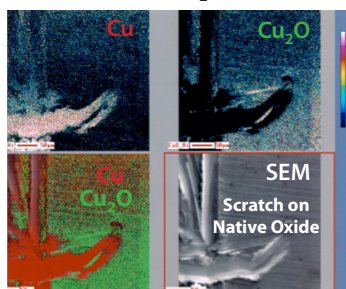
Chemical State Spectrum (one element)



Chemical State Depth Profile (Montage plot)

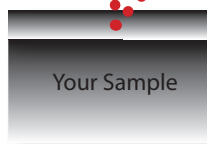


Chemical Map: Cu vs Cu₂O ΔKE~0.9 eV



High Energy Resolution* FE-AES

electrons
(1-25 KeV) electrons



1-6 nm
Conductors,
Semiconductor &
Many Insulators

STRENGTHS / ADVANTAGES

- Nanometer beam sizes: ≥10 nm
- Chemical and elemental states
- All elements, except H, He
- *Reliable quantification from peak areas*
- Analyze insulators using low voltage Ar+

DATA PRODUCED

- Elemental composition in atom%
 - Chemical and elemental state
 - spectra
 - depth & line profiles
 - maps & cross-section maps
- Angle dependent profiles
- Need special data - give us a call.

**You bring the samples,
We provide the results you need.**

Call us - We're ready to help!

ROUTINE ANALYSES

- Particles, defects, contamination
- Complete unknown - chemistry and thickness
- Elemental composition with >90% accuracy
- Elemental state info (e.g. C vs O vs Zr)
- Elements versus depth down to 200 nm

ADVANCED ANALYSES

- Chemical state depth profile down to 1000 nm
- Chemical states versus depth from 1 to 6 nm (Angle Dependent - AES)
- Surface uniformity of chemical states (XY map)
- Quality control (QC) with >90% accuracy
- REELS spectra and profiles from any insulator
- Specialty work? - Let's work together.

'FE-AES' in a Nano-Nutshell

Electrons IN - Electrons OUT (UHV)

All elements, except H, He

Detection Limit: < 0.1 atom%

Smallest analysis area: <15 nm

Depth of info: 1-6 nm

Surface or bulk

Any particle, defect or solid

Sample size: 90 x 90 x 25 nm

GLOBAL USES

- Problem Solving
- Failure Analysis
- Production Control
- Materials Development
- Quality Control
- Reverse Engineering

APPLICATIONS

- Particle analysis
- Contamination
- Thickness of films
- Delamination (peeling)
- Complete unknown
- Good vs Bad (failed)
- A versus B
- Chemical state info
- Element state info
- Rough QC
- Bulk analysis
- Powders, fibers, oils
- Many more - let's talk.

SPECTRA & PLOTS

- Survey scans
- Chemical state scans
- Atom % vs depth plots
- 3D Montage plots
- Angle dependent profiles
- Specialty spectra - call us.

REFLECTED ELECTRON ENERGY LOSS SPECTROSCOPY (REELS)

- Insulators or conductors
- High energy resolution mode
- Phase analysis
- Depth profiles, maps
- 500 - 2500 eV

Free consultation by phone.
First hour of analysis is free.
Work On-Site with us.
Call Vince at: 1.650.919.3940

NanoLab Technologies, 3833 North 1st Street, San Jose,
California 95134 USA **Website:** www.nanolab1.com
E-mail: sales@nanolab1.com, **Sales Tel:** 1.408.433.3320



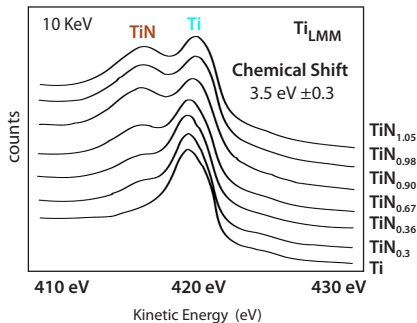
NanoLab Delivers!

NANOLAB ADVANTAGES

- Chemical States by FE-AES
- Reliable Atom % and KEs
- High Energy Resolution - REELS
- 90 mm Diameter Sample Mount
- **Inventor** of Ar Ion **Charge Control**
- 8,000 FE-AES Spectra Database
- Chemical State KEs from NIST Database
- SDP v5.0 Software (70% discount)

CHEMICAL SHIFTS - BY AES (not XPS)

- TiN clearly Shifted from Ti metal

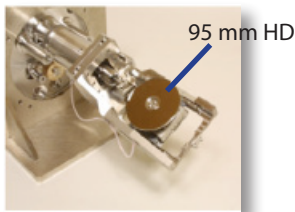


CHEMICAL SHIFTS - measured using 10 KeV

- un-doped Si vs n-Si 0.4 eV @ 1617 eV
- n-Si vs p-Si 0.6 eV @ 1617 eV
- n-GaAs vs p-GaAs 0.6 eV @ 1064 eV
- GaAs vs GaSb 0.6 eV @ 1064 eV
- Cu₂O vs Cu 0.9 eV @ 918 eV
- Si₃N₄ vs SiO₂ 3.0 eV @ 1617 eV
- SnO vs Sn 3.2 eV @ 435 eV
- Ti vs TiN 3.5 eV @ 420 eV
- ZnO vs Zn 4.0 eV @ 992 eV
- Al₂O₃ vs Al 6.0 eV @ 1393 eV
- SiO₂ vs Si 8.0 eV @ 1617 eV

SAMPLE MOUNTS

- Sample size: max 90 x 90 x 25 mm
- Rotation mount for profiling (Zalar)
- Powder mounts
- Eucentric tilt stage

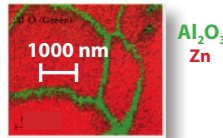


**Got a Question!
Let's Talk. Give us a Call.**

TYPICAL ANALYSIS TIMES

- Survey scan: 1-10 min
- High res scan: 5-15 min
- Depth Profile: 1-4 hr
- AR-AES: 1-2 hr
- XY Map: 1-4 hr

Chemical State Map



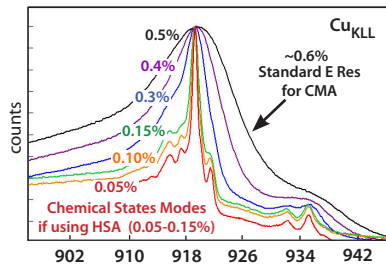
SPECIALTY WORK / DATA

- Chemical state spectra
- REELS spectra, profiles
- XY maps (up to 20 x 20 mm)
- Supporting techniques (ToF-SIMS, AFM....)

HIGH DATA QUALITY CHOICES

- Longer # of scans
- Energy res: 0.05 to 0.8%
- Grazing angle
- Large step sizes
- Ask for our data quality comparisons

ENERGY RESOLUTION LIKE XPS - 0.05% to 0.8%



***HSA WITH RETARDING LENSE ADVANTAGES**

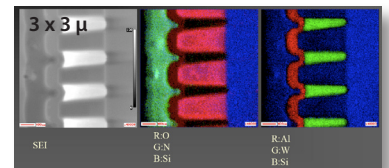
- Reliable atom%
- Reliable KEs
- Chemical state assignments
- No KE drift with focus error
- No relativistic effect on KEs

CONTENT OF REPORTS

- Summary of results - meaningful Info
- All spectra & plots (raw & processed)
- Elemental composition table(s)
- Chemical state assignments
- Image(s) of samples
- Probe current during analysis
- Data in ASCII format
- Analysis strategy agreed on
- Description of samples
- History of samples
- Description of the analysis
- Reference spectra
- Suggestions for next steps

7830-F FE-AES ADVANTAGES

- >420 Kcps using 7 channels @ 10 kV, 10 nA, 0.35%, 55 deg angle
- Max Current: >200 nA
- 0-3000 eV spectrum energy range
- 0.5-25.0 KeV electron beam
- SEM view: 40X to 300,000X
- SEM resolution: 4 nm at 25 KeV, 10 pA
- AES resolution: 10 nm at 25 KeV, 1 nA
- Continuous step sizes (0.01.....4.0 eV/step)
- 7 channeltron detectors (not 1)



NanoLab

3833 N. 1st St.



NanoLab Technologies, 3833 North 1st Street, San Jose, California 95134 USA Website: www.nanolab1.com

Sales Tel: 1.408.433.3320