

# Sub-micron X-ray Photoelectron Imaging

## Key Words

- Surface Analysis
- High Spatial Resolution X-ray Photoelectron Imaging
- Rapid Image Acquisition
- Sub-micron Resolution

Analyses which require a combination of high sensitivity and spatial resolution are possible using the Thermo Scientific ESCALAB 250. The example shown here illustrates many of the important features of the instrument.

Fast imaging is provided by the monochromatic X-ray source. A photoelectron image can be acquired in a few seconds for accurate sample alignment.

A high quality photoelectron image can be produced in a few minutes. The images shown here have a spatial resolution of less than 1  $\mu\text{m}$ . All images are acquired with 256 x 256 pixels.

## Gold Pad on GaAs

Microelectronic devices provide a critical test of the resolution of any imaging instrument. In this example gold features, deposited on a gallium arsenide substrate, were analyzed.

The retrospective line scan at the position shown on the high spatial resolution image illustrates sub micron spatial resolution.

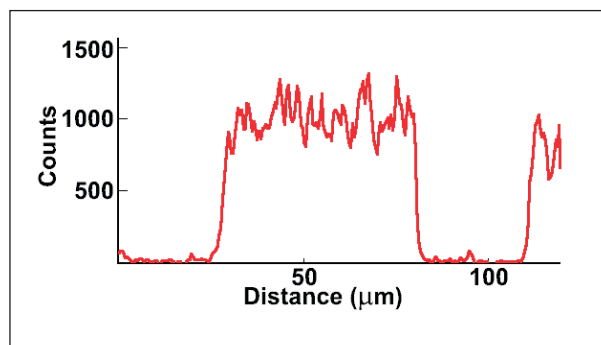


Figure 1: Retrospective line scan from image (Figure 3)

## Rapid XP Image for Alignment

Au  $4f_{7/2}$  X-ray photoelectron image (peak - background).

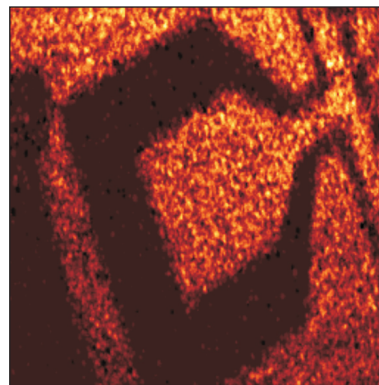


Figure 2: Gold X-ray Photoelectron image (peak - background) 200  $\mu\text{m}$  field of view, 12 second acquisition

### Conditions:

Total acquisition time: 12 seconds  
Pixel resolution: 256 x 256  
Field of view: 200  $\mu\text{m}$   
Monochromated X-ray spot size: 650  $\mu\text{m}$

## High Spatial Resolution XPS Image

Au  $4f_{7/2}$  X-ray photoelectron image (peak - background).

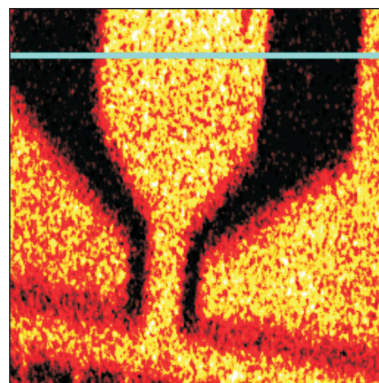


Figure 2: Gold X-ray photoelectron image (peak - background) 120  $\mu\text{m}$  Field of view, 5 minute acquisition

### Conditions:

Total acquisition time: 5 minutes  
Pixel resolution: 256 x 256  
Field of view: 120  $\mu\text{m}$   
Monochromated X-ray spot size: 650  $\mu\text{m}$

[www.thermo.com/surfaceanalysis](http://www.thermo.com/surfaceanalysis)

*In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.*

**Africa**  
+43 1 333 5034 127

**Australia**  
+61 2 8844 9500

**Austria**  
+43 1 333 50340

**Belgium**  
+32 2 482 30 30

**Canada**  
+1 800 530 8447

**China**  
+86 10 8419 3588

**Denmark**  
+45 70 23 62 60

**Europe-Other**  
+43 1 333 5034 127

**France**  
+33 1 60 92 48 00

**Germany**  
+49 6103 408 1014

**India**  
+91 22 6742 9434

**Italy**  
+39 02 950 591

**Japan**  
+81 45 453 9100

**Latin America**  
+1 608 276 5659

**Middle East**  
+43 1 333 5034 127

**Netherlands**  
+31 76 579 55 55

**South Africa**  
+27 11 570 1840

**Spain**  
+34 914 845 965

**Sweden/Norway/  
Finland**  
+46 8 556 468 00

**Switzerland**  
+41 61 48784 00

**UK**  
+44 1442 233555

**USA**  
+1 800 532 4752

[www.thermo.com](http://www.thermo.com)



VG Systems Ltd. Trading as  
Thermo Fisher Scientific, East  
Grinstead, UK is ISO Certified.

AN31051\_E 05/08M

©2004, 2008 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific Inc. and its subsidiaries. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.