EAG[SM]
Evans Analytical Group

News and Information

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Specialists in Materials Characterization

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World's Largest Independent Surface Analysis Laboratory

Photovoltaics

Recent energy prices and the need to reduce greenhouse gases have renewed interest in alternative energy sources such as solar energy. The viability of solar energy is highly dependent on the cost of developing and producing photovoltaics, and the efficiency with which they convert radiant energy into electricity.

Surface analytical techniques can provide valuable insight into photovoltaic materials and their processing, showing how they correlate to device performance. This information can then be used to reduce contamination and defects and improve manufacturing processes, thus increasing yields and lowering costs. These techniques can also be used in research and development of new materials and processes needed to achieve improved device efficiencies and faster time to market with superior products.

Put EAG on your Team

EAG can provide fast, state-of-the-art measurements that can help with your process development. A wide array of analysis techniques are available to give you the insight you need. Our experts can examine layer composition, thickness, dopants, impurities, cross-sections, and grain structures- all of which can provide crucial information relating to your product's performance and manufacturing yield.

Some examples are:

Composition:

We have analytical tools that will show you layer composition and thickness to within a few percent. We can quantify most materials including c-Si, α-Si, α-SiGe, CIGS, CdTe, ITO and more...

Dopants:

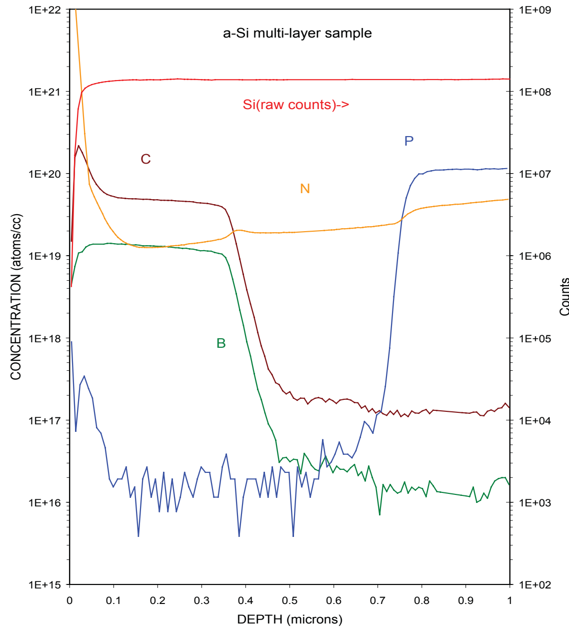
We can show dopant concentration as a function of depth to within 5% accuracy. We can quantify all dopants including hydrogen in most semiconductor materials. We can also provide ultra-high depth resolution SIMS profiles where the dopant distributions in layers as thin as 2.0 nm can be measured.

Contaminants:

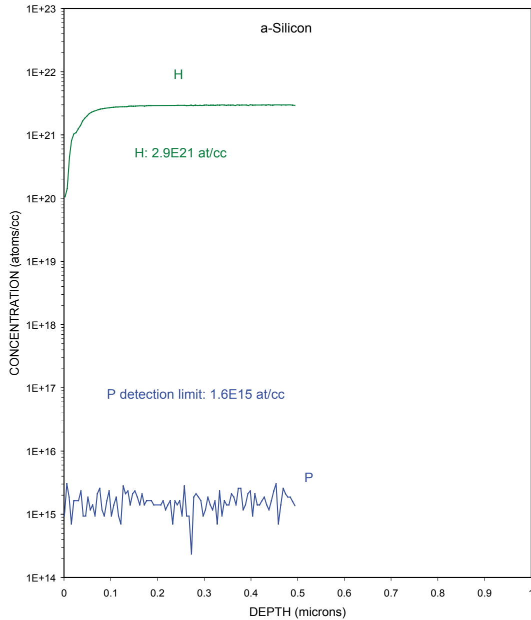
Our measurements provide ppm down to ppb detection limits for almost all element in the periodic table. If you have a problem with contaminants, we can help you solve it!

Grain Structure:

We can differentiate between c-Si, α-Si and poly-Si and report percentages of each. We can measure average grain size in thin poly-Si films.



Example of a multi-species SIMS depth profile acquired from a multi-layer α-Si sample.



Depth profile for phosphorous in an α-Si:H sample heavily doped with hydrogen. The data shows excellent detection limits for P.

Cross-sections:
Images can show additional details of grain structure and orientation as well as layer thickness and film integrity.

Example:
Secondary Ion Mass Spectrometry is one of our key analytical techniques for photovoltaic layer structure characterization. Here we show examples of some of the information that SIMS can provide.

For α-Si, ƐAG can Provide:

- H Concentration Profile
- Accurate dopant profiles for B, C, N and P.
- Improved detection limit for P.
- Accurate measurements of hydrogen concentration in a wide range from 1ppm through 30 at%.
- Improved detection limits for H, C, O and N in very thin α-Si layers.

We can also provide information for α-SiGe, c-Si, polysilicon, ribbon Si, CdTe, CuInGaSe, ITO, dye cells, organics cells, device samples (30 μsize) for failure analysis and reverse engineering.

Consultation:
Put **ƐAG** on your development team. Call us to find out how we can help.

SIMS Detection Limits of selected elements under profile condition (atoms/cm^3)

	CdTe	Si*	GaAs	InP
C	2E16	1E16	3E15	3E15
O	4E16	5E16	3E15	3E15
F	2E14	2E14	-------	-------
Na	5E13	5E13	-------	-------
Al	5E13	2E13	-------	-------
Si	1E15	-------	6E13	6E13
S	3E15	1.2E15	6E13	1E15
Se	-------	-------	1E13	1E13
Cl	2E15	2E15	-------	-------
H	-------	1E17	1E17	1E17
K	5E13	1E13	-------	-------
Ca	5E13	1E13	-------	-------
Fe	5E14	2E14	-------	-------
Br	-------	5E14	1E14	1E14
B	-------	3.2E14	-------	-------
N	-------	1.9E15	-------	-------
Te	-------	-------	1E13	1E13
Cu	5E14	2E14	-------	-------

* Detection limits under Bulk analysis conditions, B: 1E13; C: 2E15; O: 5E15

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WORKING SMARTER™
A COURSE IN ANALYTICAL TECHNIQUES

Date	Location / Topic
Sep. 7, 2006	Sunnyvale, CA Semiconductor
Sep. 7, 2006	Round Rock, TX Semiconductor
Oct. 12, 2006	East Windsor, NJ General Overview
Nov. 2, 2006	Chanhassen, MN Biomed

New TOF-SIMS and XPS Instruments

Sunnyvale, CA — July 10, 2006 — Evans Analytical Group LLC ("EAG") announced today that it has purchased several major analytical instruments for the express purpose of adding capacity and capability in key areas as a result of continued growing demand for its services. EAG, a world leader and innovator in surface analysis and materials characterization for over 28 years, is the largest independent analytical services company in the world with a global network of over 85 major analytical instruments and 10 laboratories/sales offices.

EAG has purchased a Physical Electronics (PHI) TRIFT III Time-of Flight Secondary Ion Mass Spectrometry (TOF-SIMS) instrument, as well as a gold cluster ion source. TOF-SIMS provides high sensitivity surface analysis of the near surface (top nanometer) of materials. This TRIFT III, the fourth TOF-SIMS instrument within the EAG labs, adds capacity and instrument availability for the company to continue to develop depth profiling applications. More importantly, the gold source greatly improves sensitivity for organic compounds, relevant to many applications but, in particular, enhancing our service offering for the Company's growing biomed/biotech and pharmaceutical related business.

In addition, EAG has purchased two PHI Quantum X-ray Photoelectron Spectroscopy (XPS) instruments, the eleventh and twelfth XPS instruments for EAG. One of the Quantums will be installed in the company's New Jersey lab, adding small spot analysis capability in closer proximity to East Coast and European customers.

Further, EAG has recently purchased a Cameca ims-4f Secondary Ion Mass Spectrometry instrument, increasing its network-wide fleet of Cameca SIMS instruments in commercial operation to nineteen (19). This latest addition enables EAG to continue to enhance customer service by improving turnaround time via added capacity and data quality via instrument dedication to application-specific usage.

Tom Pfeil , EAG's CEO commented: "We are committed to extending our global leadership position in surface analysis services. EAG will continue to aggressively invest in advanced instrumentation and testing protocol development in order to meet our customers' current and future analytical needs."

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To learn more about EAG solutions, visit www.eaglabs.com

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