



# SEMICONDUCTOR INDUSTRY SOLUTIONS

SYFT TECHNOLOGIES

**syft**<sup>TM</sup>  
Technologies

## DIVERSE SOLUTIONS FOR THE SEMICONDUCTOR INDUSTRY

The semiconductor industry utilizes inorganic, volatile organic, and semi-volatile organic compounds (VOCs and SVOCs) extensively in component manufacture for modern devices. These compounds are frequently critical to a very specific process, but when occurring elsewhere they cause major problems for product quality, or to the health of personnel or the environment.

Selected ion flow tube mass spectrometry (SIFT-MS) is a robust analytical technique that addresses both quality and safety issues. It quantifies VOCs, SVOCs, and inorganic gases in seconds at the required concentrations in one simple analysis, so that harmful release emissions are detected and dealt with immediately. This provides economic benefits because it prevents use of defective raw materials and reduces product

losses if release occurs during manufacture. Rapid SIFT-MS analysis also benefits the wellbeing of both employees and the environment.

This brochure outlines several SIFT-MS-based quality assurance and environmental solutions provided by Syft Technologies. The flexibility of the Syft instruments means they can adapt with your business as analysis needs change.

## AIRBORNE MOLECULAR CONTAMINANT (AMC) MONITORING IN THE CLEANROOM

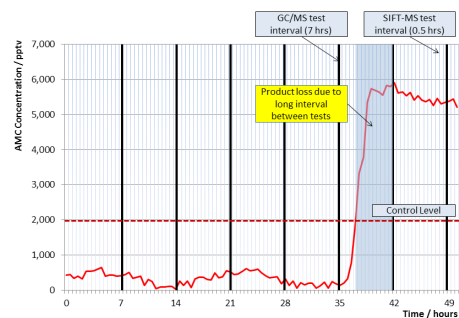
Successful fabrication of semiconductors, photovoltaics and LCD/LED panels requires extremely high precision manufacturing equipment in an ultraclean environment. Volatile or semi-volatile contaminants in air can degrade semiconductor performance and/or greatly shorten expensive maintenance cycles or operational service of fabrication equipment.

The SIFT-MS technique provides rapid, high-sensitivity analysis of air for the majority of compounds that are important in the semiconductor and

related industries, greatly reducing product loss and equipment failure.

Applications of SIFT-MS in the semiconductor industry include:

- 24/7 monitoring of air in cleanroom (including multipoint sampling options)
- 24/7 monitoring of ambient air (before and after filtration)
- Targeted monitoring of 'hotspots'



Applying SIFT-MS in a multiple-point sampling scenario can prevent hours of production losses due to more rapid analysis.

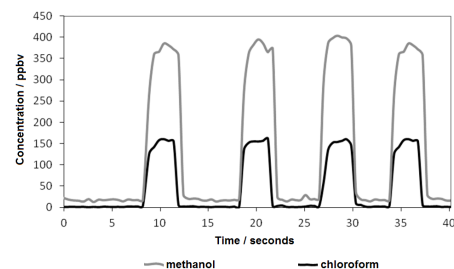
## SCREENING RAW MATERIALS AND FINISHED PRODUCT

A wide variety of solvents and other hazardous substances are used during manufacture of electronic components and packaging systems. SIFT-MS provides a very rapid and highly sensitive solution for screening incoming raw materials and your own finished products.

Benefits of SIFT-MS include:

- Direct analysis through elimination of chromatographic separation, making it ideal for detection of volatile solvents

- Very high-throughput screening via autosampler integration provides rapid warning of quality issues and greatly reduces the test cost per analysis
- Wide linear and dynamic ranges allows one instrument to be applied to multiple screening tasks
- Green, solvent-free analysis for assuring environmentally friendly products.



Rapid analysis for residual VOCs using SIFT-MS.

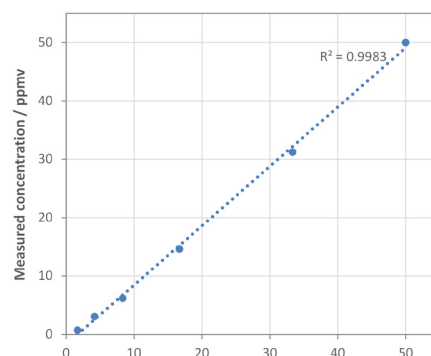
## ASSURING EMPLOYEE WELLBEING

Manufacture and processing of state-of-the-art semiconductor materials requires use of diverse organic and inorganic hazardous substances, including acids such as HCl and HF. SIFT-MS provides a very rapid and highly sensitive solution for preventing employee exposure to dangerous chemicals.

Benefits of SIFT-MS include:

- Unprecedented comprehensive detection by applying eight reagent ions

- Instant feedback via rapid analysis, allowing problems to be resolved
- A wide dynamic and linear range to accommodate the greatly varying exposure limits of different compounds
- The ability to easily and rapidly monitor multiple sampling points for different hazardous compounds.



Linear detection of HCl using the  $\text{NO}_2^-$  reagent ion of SIFT-MS.

## STACK AND FENCELINE MONITORING

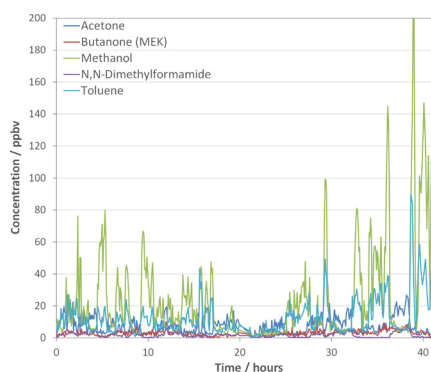
SIFT-MS is the premium analytical technique for providing early warning of harmful or nuisance emissions from stacks or at the boundary of manufacturing facilities. SIFT-MS offers a unique set of benefits:

- One simple analysis provides high-sensitivity detection of a wide range of compounds (e.g. hydrocarbons, halocarbons, reduced sulfur compounds, amines, and acid gases)
- Direct, real-time analysis enables instantaneous action to be taken when issues arise

- A wide dynamic range combined with high selectivity enables one instrument to perform different analyses at multiple sample points.

SIFT-MS provides consistent, quantitative analysis of VOCs in applications such as:

- Direct stack gas analysis
- Fence-line monitoring
- Objective instrumental odor analysis.



Fence-line monitoring data from Taiwan, ROC

## SUMMARY

Syft Technologies' SIFT-MS instruments offer unparalleled opportunities for highly sensitive, selective, and non-discriminatory analysis of organic and inorganic gases in diverse applications within the semiconductor industry. By delivering real-time results, Syft instruments provide a unique opportunity for on-line product quality

decisions to be made, which reduce the risks of product loss and brand damage. The same core technology can be applied to protect workers and the environment from hazardous emissions.

Syft Technologies is committed to customer success, delivering user-friendly software, product reliability

and full after-sales support. Syft's instruments are easily integrated with existing infrastructure and industry-standard autosamplers.

## SELECTED ION FLOW TUBE MASS SPECTROMETRY (SIFT-MS)

SIFT-MS is the leading real-time analytical technique for comprehensive gas analysis to ultra-trace levels.

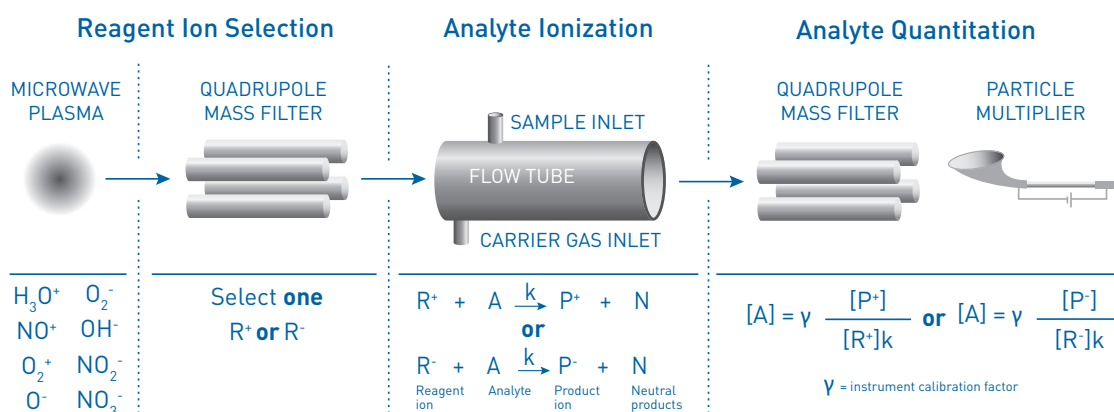
SIFT-MS uses ultra-soft, precisely controlled chemical ionization coupled with mass spectrometric detection to rapidly quantify VOCs and permanent gases to low part-per-trillion concentrations by volume

(pptv). Eight chemical ionization agents (reagent ions) are applied in Syft instruments:  $\text{H}_3\text{O}^+$ ,  $\text{NO}^+$ ,  $\text{O}_2^+$ ,  $\text{O}^-$ ,  $\text{O}_2^-$ ,  $\text{OH}^-$ ,  $\text{NO}_2^-$ , and  $\text{NO}_3^-$ .

These eight reagent ions react with VOCs and inorganic gases in very well controlled ion-molecule reactions, but they do not react with the major components of air ( $\text{N}_2$ ,

$\text{O}_2$ , and Ar). This enables SIFT-MS to analyze air at trace and ultra-trace levels without preconcentration.

Rapid switching of eight reagent ions provides unsurpassed selectivity compared to other direct MS techniques.



## BENEFITS OF SYFT SIFT-MS INSTRUMENTS

- Instantaneous identification and quantitation of VOCs and inorganic gases using a fully integrated, extensive chemical ionization library
- Real-time gas analysis to low part-per-trillion by volume (pptv) concentrations with class-leading selectivity, no preconcentration, and high robustness to humidity
- Analysis of diverse compounds in a single analysis (e.g. acid gases, amines and organosulfur compounds)
- Ease of operation with push-button simplicity, no sample preparation, and comprehensive LabSyft data analysis software
- Designed and engineered for use in demanding environments, with easy integration into sample delivery systems (including autosamplers) and IT infrastructure
- Reliable, low maintenance instruments and accessories, with market-leading aftersales support.

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