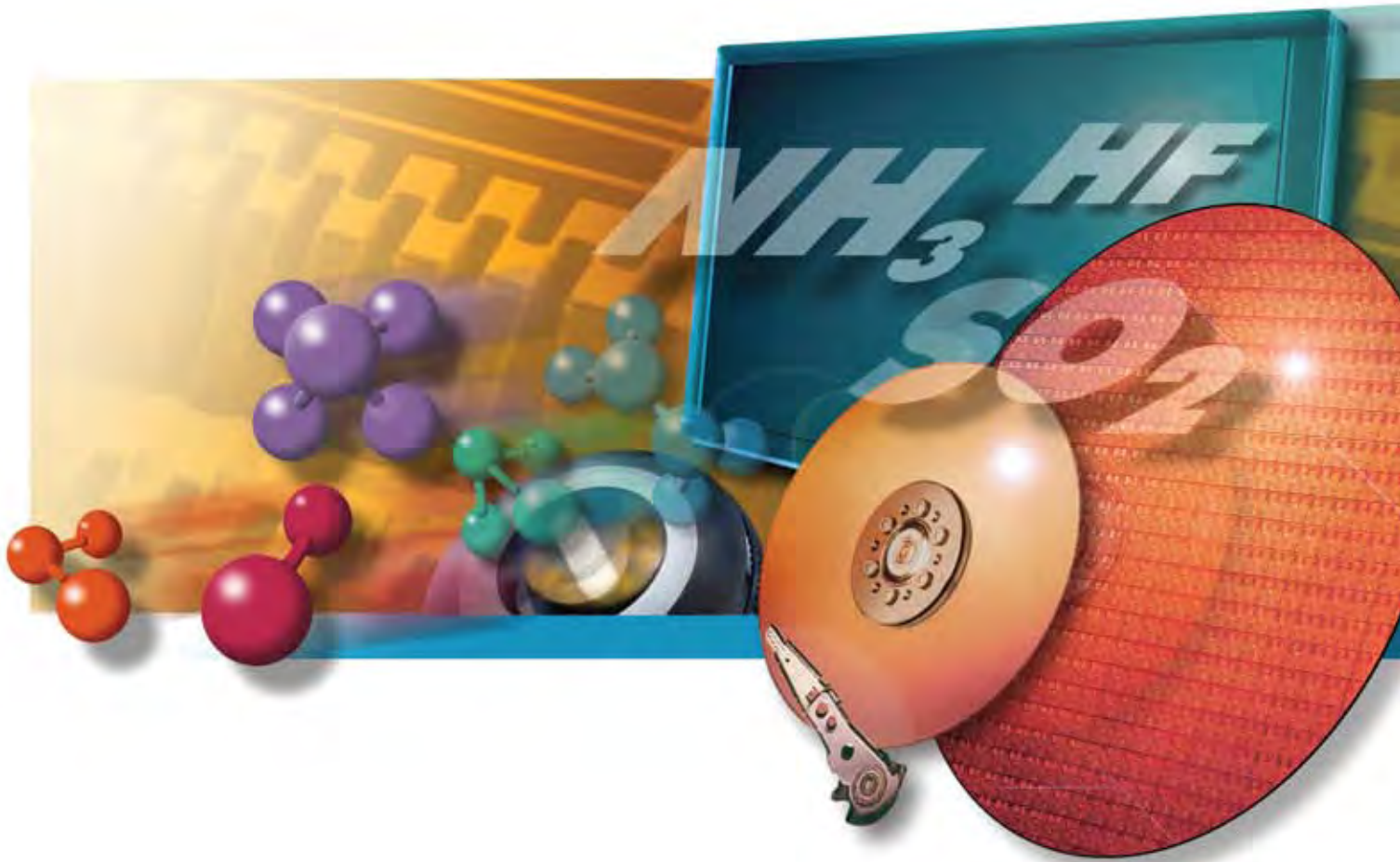


MOLECULAR CONTAMINATION SERVICES

Protecting Critical Yield
in Photolithography and Clean Processes



Without measurement, there is no control.

THE IMPORTANCE OF MOLECULAR CONTAMINATION MONITORING

MOLECULAR CONTAMINATION SERVICES

Types and Sources of Molecular Contamination

With increasing concerns over its damaging effects, SEMI issued the F21-95 standard specifying four classes of airborne molecular contamination (AMC): molecular acids, bases, condensables, and dopants. These contaminants come from a variety of sources, including:

- Process chemicals, gases, and CDA
- Outside air
- Cleanroom materials
- People

In other words, molecular contamination can come from just about anywhere inside or outside the fab. Due to the impact described below, it's clear that critical processes like photolithography need to be carefully monitored to identify levels and types of molecular contaminants throughout the fab.

The Impact of Molecular Contamination

Reductions in wafer yield, degradation of equipment parts and performance, and the loss of millions of dollars of revenue are often the end result of molecular contamination. For example, the photolithography process is impacted at every major stage in the process from resist dispense to exposure to develop and bake. All processes are susceptible to molecular contamination's damaging effects. Typical impacts include:

- Hazing of optics, masks, steppers, and wafers
- Degradation of photoresist
- Corrosion of surfaces, wiring, and substrates
- Reduction of chemical filter lifetime or efficiency
- Wafer damage (electrical shorts, current leakage, etc)
- Corrosion of disk drive media

Site Survey

Site Survey services provide off-line analysis of AMC levels at multiple locations. The AirSentry Surveyor and AccuSorb tubes are used to collect ambient air samples over several hours. Lab analysis is then performed to determine levels and species of contamination at each location.

- Acids analysis
- Ammonia and amines analysis
- Organics analysis (hydrocarbons, siloxanes, NMP, etc)

Site surveys are often required by tool manufacturers prior to installation. It is also recommended to regularly monitor after installation to ensure that acceptable levels are maintained. Understanding the scope of contaminating species will help the effort to control the process and the cleanroom.

Process Characterization and Troubleshooting

Process characterization services utilize the AirSentry Surveyor with AccuSorb technology to analyze AMC levels at multiple locations over time. Data is collected, plotted, and analyzed to characterize the process effects over a range of settings or conditions.

Troubleshooting services combine both off-line analysis and real-time monitoring to help identify sources of molecular contamination. Particle Measuring Systems' experts respond with the necessary instruments and analysis to rapidly locate contaminating species, events, and sources.

AIRSENTRY SURVEYOR

AMC Baseline and Identification as Easy as 1-2-3

1. Place Surveyor in the monitoring point of interest.
2. Turn on the Surveyor. The Surveyor utilizes a timing circuit to automatically turn off after a set period of time, engaging Teflon solenoid valves that prevent external contamination from spoiling the collected air sample.
3. Return Surveyor to Particle Measuring Systems for a full concentration and speciation analysis, in addition to a report identifying areas of concern and possible contamination sources within the cleanroom.

The AirSentry Surveyor offers an easy and effective technique for AMC monitoring. With three simple steps, engineers obtain the necessary data to baseline, characterize, or troubleshoot molecular contamination.

The Surveyor incorporates three proprietary AccuSorb sorbent tubes, individually created with unique and specific media to maximize trapping and recovery efficiency of acid, base, and organic compounds of interest.

AccuSorb Sorbent Tubes

Working with an independent analysis laboratory, Particle Measuring Systems AccuSorb tubes were designed with performance in mind; specifically created to maximize sensitivity for capturing part-per-trillion levels of molecular contamination. The unique solid-state media is distinctively designed for each class of compounds (acids, bases, or organics) utilizing proprietary shape, size, and porosity attributes to allow optimum surface area for chemically trapping the given contaminant.



AccuSorb Technology



PARTICLE MEASURING SYSTEMS IS THE RIGHT CHOICE

Particle Measuring Systems offers the most complete range of molecular contamination services and real-time monitoring equipment. We provide comprehensive real-time and grab-sampling solutions to identify, troubleshoot, and resolve AMC contamination issues from beginning to end.

AirSentry Surveyor

Provides baseline, process validation, or troubleshooting measurements with complete concentration and speciation analysis utilizing AccuSorb Technology.



AirSentry II

A continuous and real-time point-of-use monitor for identifying AMC with part-per-trillion (ppt) level sensitivity.



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AiM-200

Surface Acoustic Wave Technology identifies the impact of molecular contamination on critical surfaces such as wafers, lithography optics, flat panel displays, and hard disk drives.



AirSentry System

Identifies non-methane hydrocarbons and silicone-based compounds, as well as SO₂, which are primary contaminants that directly cause optical hazing.



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