CFT Philips Centre for Industrial Technology

IN FOCUS

even class 1 cleanrooms are contaminated with volatile components

deep UV lithography suffers from minor amounts of ammonia (NH_3)

chemicals used in litho-graphy can be a major source of contaminants

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Contamination control

How **clean** is your cleanroom?

The ever increasing demands for contamination control in IC-technology has led to the construction of cleanrooms in which hardly any particle can be detected. But even a class 1 cleanroom does not mean that gaseous contaminations will be absent. Even worse: the activities that take place in a cleanroom, like lithography, form the main source of such contaminants.

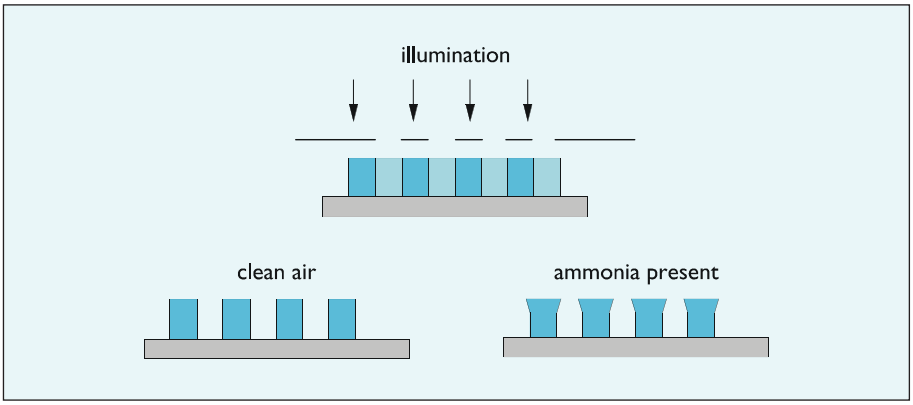

Fig. 1. Photoresists used in deep-UV lithography are very sensitive towards basic compounds. Small amounts of ammonia in the air of a cleanroom can distort the fine details of the image after development.

Deep-UV lithography

Going to ever smaller details, not only particles have to be considered, but also volatile contaminants. For instance ammonia (NH_3) at levels of 1 µg/m^3 (ppb), can already cause decreased resolution in deep UV-lithography (see Fig. 1).

Concentrations in outside air can be as high as 50 µg/m^3, or even higher depending on the level of air-pollution in your area.

Normally this ammonia is not removed by cleanroom-filters and can, therefore, harm your process.

We can measure NH_3 levels as low as 0.1 µg/m^3 enabling you to monitor your cleanroom atmosphere to judge whether installation of special filters to protect your most sensitive processes is necessary.

Organic contaminants

Many organic vapours are generated in the cleanroom itself, mainly because of lithographic processes. Some organic compounds cause deposits on lenses, mirrors etc. which can result in decreased light-throughput in lithographic systems.

Using a special sampling procedure and analysis with gaschromatography coupled with mass spectrometry, we can map all organic vapours present in your cleanroom down to levels below 1 $\mu g/m^3$ (see Fig. 2). Such measurement will help you in improving contamination control for critical processes.

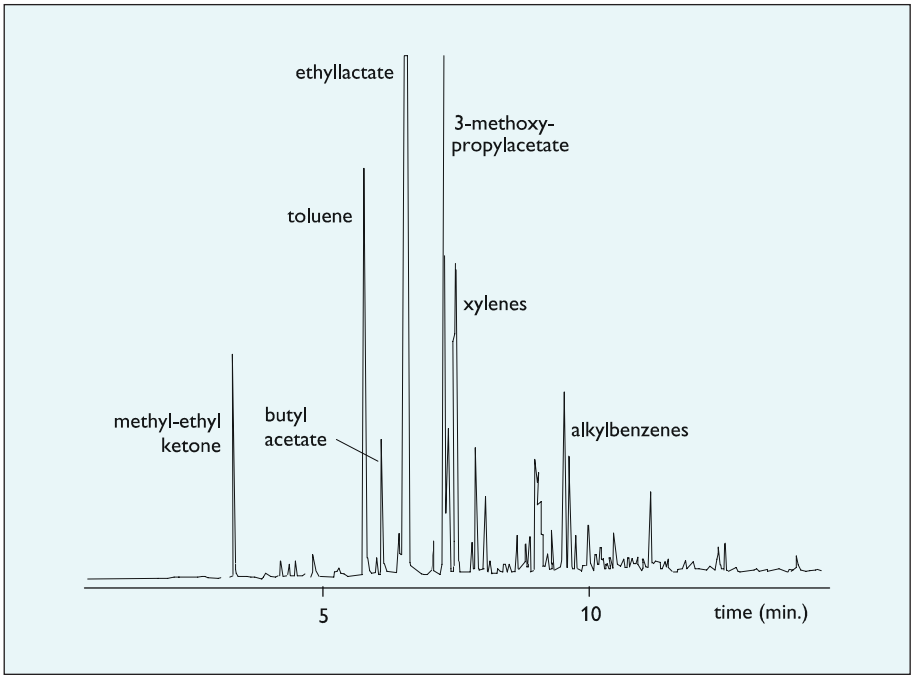

Fig. 2. Gaschromatographic analysis of air from a typical cleanroom. Many organic vapours are shown at ppb level. Components like ethyllactate and butylacetate are present in photoresist solvents.