Course material

Course:

Micro and Nanofabrication (MEMS)

Video:

1.6 Cleanroom basics, II Cleanroom strategy

Concepts (extracted from automatically generated subtitles):

Clean air. Vertical laminar flow. Hepa filters. Clean conditions. Ceiling of the room. Processing of the wafers. Good purity of the air. Part of the laminar flow. Really clean room. Individual work stations. Environmental conditions. Concept of the total clean room. Drawback of such laminar flow hood. High quality. Room.

to video sequence search
(within Micro and Nanofabrication (MEMS).)

to video

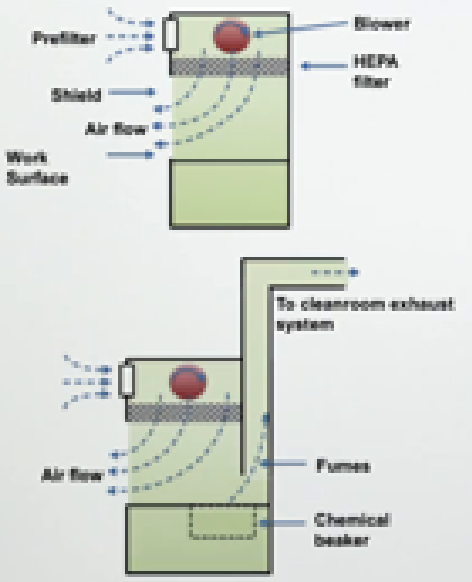
...

notes

summary

0m 0s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

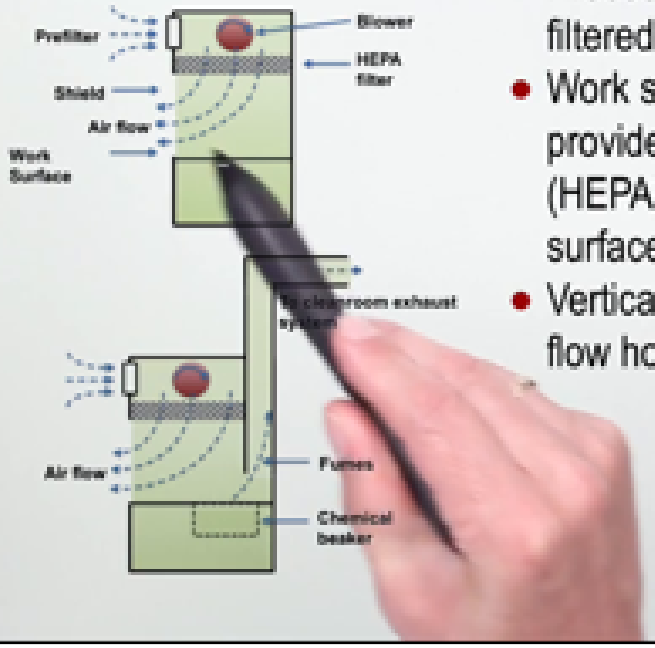
How does one obtain clean air with a minimum number of particles?

notes

summary

0m 1s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

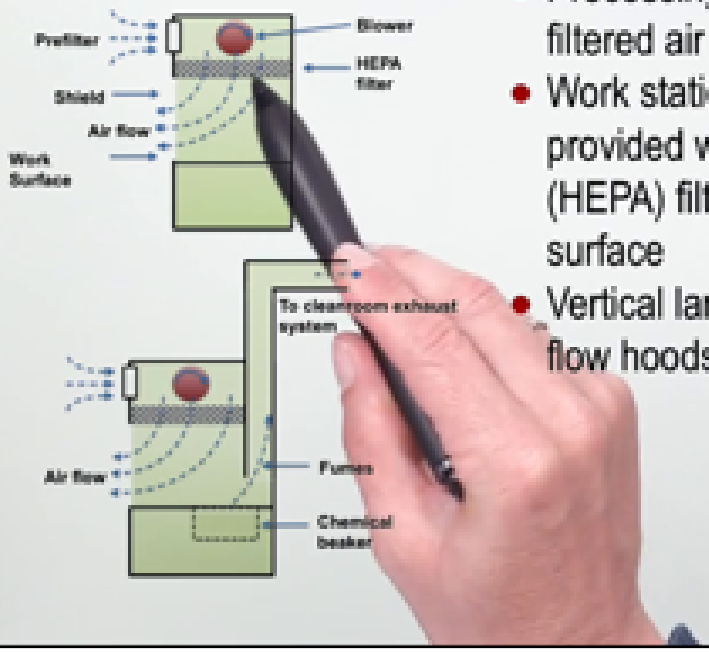
The first possibility is to do the processing of the wafers

notes

summary

0m 5s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

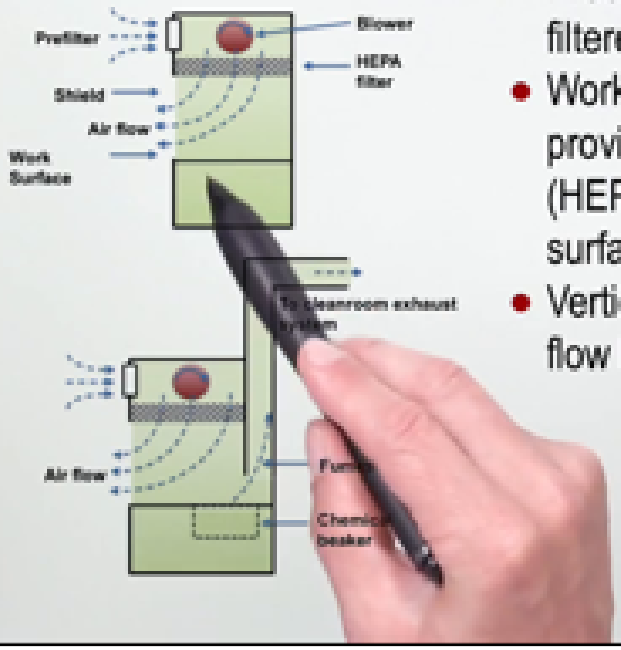
in individual work stations with filtered air. These work stations or hoods are arranged in rows and are provided with high efficiency particulate arrest, or HEPA filters, which contain small holes and a large surface.

notes

summary

0m 16s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

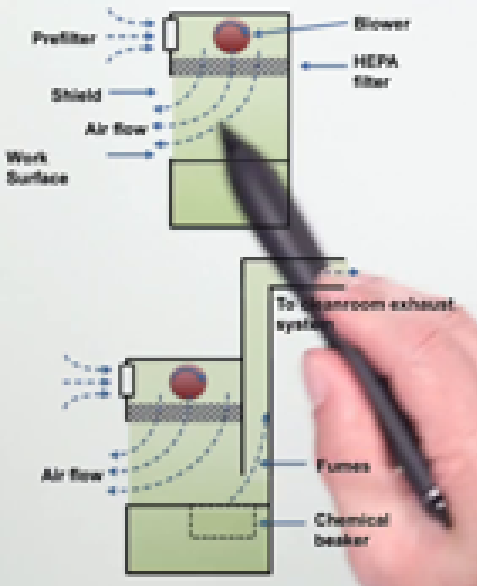
Air is blown through such a filter and a vertical laminar flow exposes the wafers

notes

summary

0m 37s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

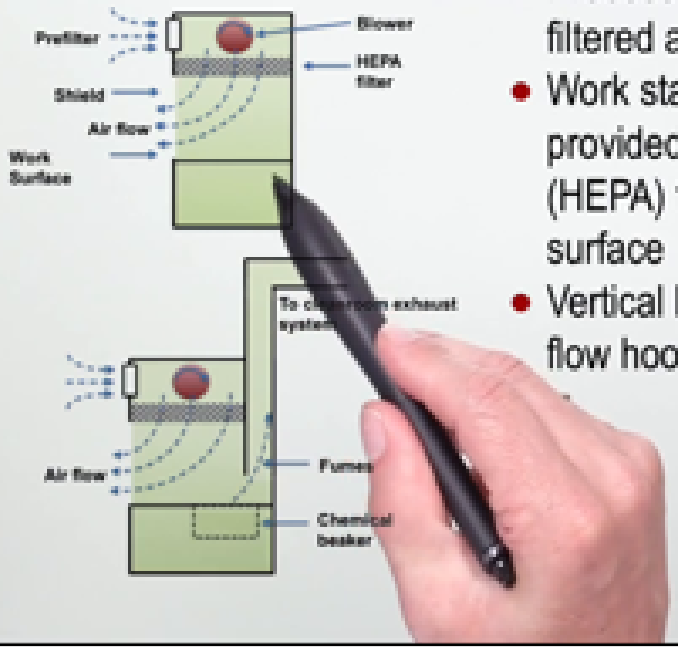
that are manipulated here in the hood. So the wafers are only exposed to highly purified air with a minimum number of particles. If chemicals are operated in the hood,

notes

summary

0m 45s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

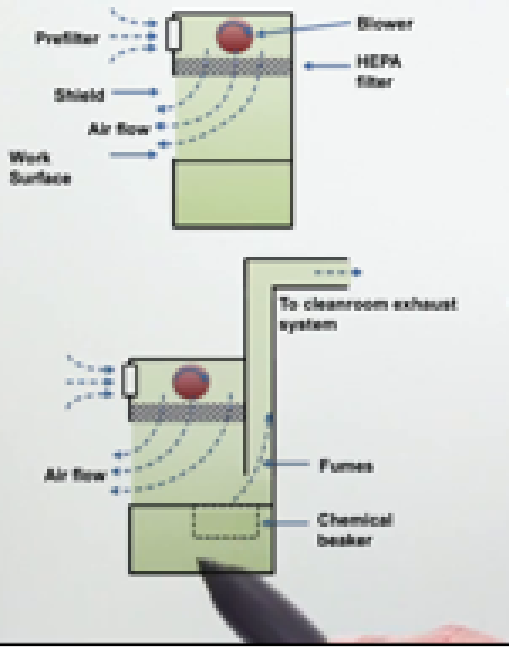
this is not the right construction, as the toxic fumes of the chemical

notes

summary

1m 1s

Cleanroom work station strategy



- Processing of wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate arrestance (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used

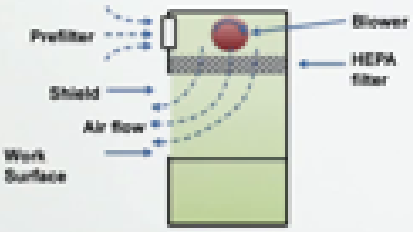
would go to the operator. If one needs to manipulate chemicals, the hood is of this type. Part of the laminar flow is evacuated via this line

notes

summary

1m 2s

Cleanroom work station strategy



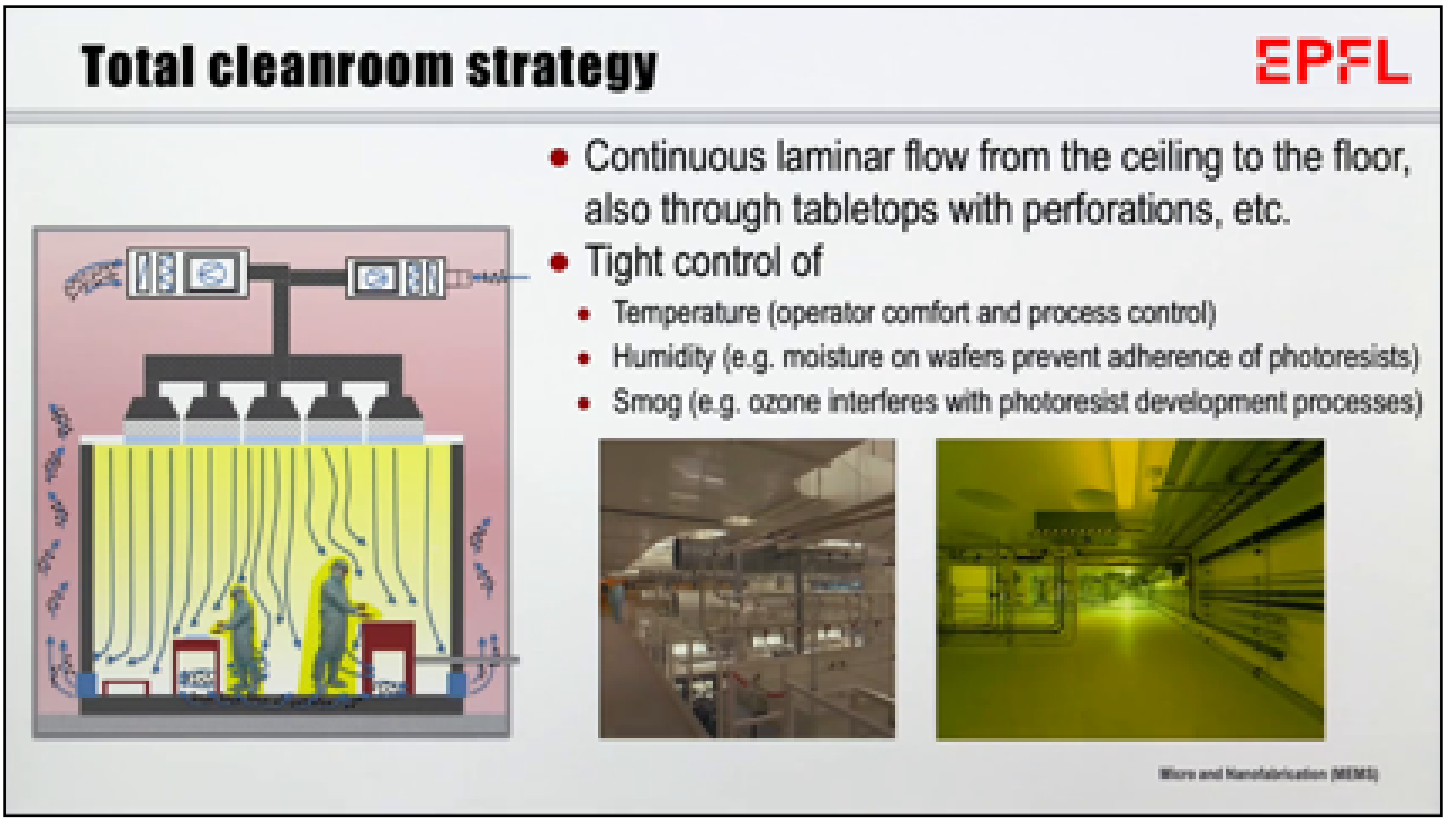
- Processing wafers in individual work stations with filtered air
- Work stations (hoods) are arranged in rows and are provided with high-efficiency particulate attenuation (HEPA) filters, containing small holes and a large surface
- Vertical laminar flow (VLF) and horizontal laminar flow hoods are used
- Drawback of laminar flow hood: vulnerability to contamination from people in the room → better build HEPA filters in ceiling of the room and provide clean conditions everywhere; this is more expensive

so that there is no risk for the operator who is working here to be in contact with these chemical vapors because basically, he is doing his manipulation here in this area. The picture on the left shows a hood for the manipulation of chemicals. A drawback of such laminar flow hood is that the environmental conditions can change due to the people that are present in the room and who can be the origin of particles underneath the hood. Therefore, a better but also a more costly solution, is to build these HEPA filters in the ceiling of the room

notes

summary

1m 25s



and provide everywhere in the room clean conditions. That is what makes a really clean room. This brings us to concept of the total clean room where the complete clean room has purified air due to the presence of a continuous laminar flow from the ceiling to the floor. Also, through table tops with perforations, and so on. Purified air will expose the wafers and the people, and any generated particles will be transported away through the floor and be purified before being re-injected through HEPA filters in the clean room. The clean room not only has good purity of the air, but there is also a tight control of the temperature which is essential for operator comfort and for reproducibility of chemical processes. Also the humidity has to be controlled as the presence of moisture on wafers can influence many processes like the adhesion of a photoresist for example. Also, smoke needs to be avoided.

notes

summary

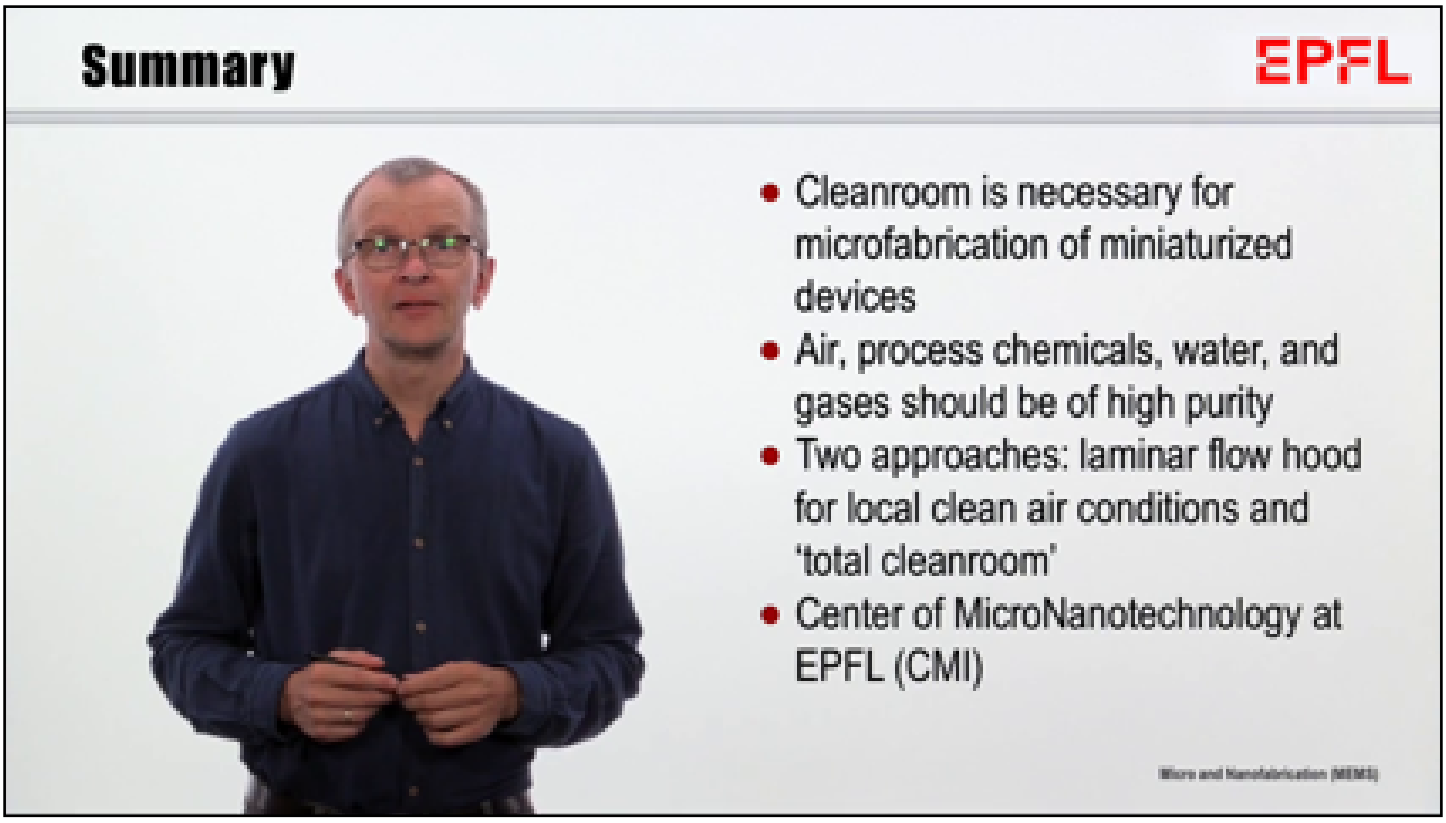
2m 13s

As a reactive gas, it is like ozone, it can interfere with many chemical processes that are running in the clean room. These two photographs show part of the air-handling infrastructure of a clean room that is present above and below the clean room area. A high quality clean room is essential for high quality research in microfabrication related areas. At EPFL, we have such a clean room which really is a corner stone of many of our research and educational activities. The following video provides a glimpse of the EPFL center of micro and nano technology.

notes

summary

3m 37s



In this lesson I explained that the clean room is a necessary infrastructure for the reproducible microfabrication of miniaturized devices. Air, process chemicals, water and gases should all be of high purity. We have discussed two approaches of creating a clean room environment. First there was the laminar flow hood for creating locally clean air conditions and next, there was a total clean room strategy Finally, I introduce to you the center of micro and nano technology at EPFL.

notes

summary

5m 13s