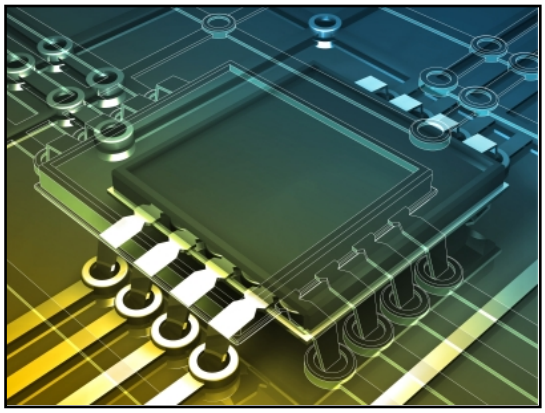
Moisture Control During Semiconductor Manufacturing

Semiconductors, microcircuits and microchips manufacturing requires very precise condition to be maintained in the manufacturing/ processing area. Components used in assembly or processing of semiconductors are generally hygroscopic and thus highly susceptible to high humidity conditions.



Effects of Uncontrolled Humidity

The hygroscopic components can leafs to:

- Corrosion of circuits points
- Operational failure of semiconductor assembly
- Improper adhesion of photo resists

Causes

The major cause is condensation on microchips circuit surface.

General Recommendations

Relative Humidity in Semiconductor Assembly Manufacturing Areas should be maintained at 30% RH at 20ºC (70ºF).

Bry-Air Solution

In the **assembly area**, during the production of semiconductors and integrated circuits excessive moisture adversely effects the bonding process and increases defects. Photosensitive polymer compounds called photoresists are used to mask circuit lines for etching process. Due to their hygroscopic nature they absorb moisture resulting in the microscopic circuit lines being cut or bridged, leading to circuit failure.

Wafer Fabrication Area: During wafer manufacture the spinners spray developer on the wafer surface, causing the solvent present on the wafer to evaporate rapidly, thereby cooling the wafer surface. This results in condensation of water vapour from the air on the wafer surface. This extra water on the wafer causes characteristics of the developer to change. The resist also absorbs the moisture causing the polymer to swell. Controlling relative humidity at 30% eliminates the possibility of the cooling the wafer surface lower than the dewpoint of the air surrounding the wafer surface, thus preventing failure and spoilage.

Photo Lithography Room: Conditions in photolithography room need to maintained between 20% to 35% RH at about 700°F. Excessive moisture causes the silica to absorb moisture, resulting in improper adhesion of photoresist leading to stress fracture and surface defects.

Faster Vacuum Pump Down: If humidity levels are high, operation of vacuum equipment like cryopump is slowed down due to large load of water vapour. If the RH levels can be maintained around 30-35% than the reduced considerably resulting in increased batch processing speed.

Protection of EPI equipment: Water vapour or moisture condenses on chilled surfaces of epitaxial equipment corroding of components resulting in operation failure and slow down of the process.
Bry-Air Desiccant Dehumidifiers can effectively maintain the most stringent humidity conditions required for semiconductor manufacturing areas, since they are capable of maintaining RH as low as 1% or even lower at a constant level, regardless of ambient conditions.