405 E. Santa Clara St., Arcadia, CA 91006-7218
Tel: (626) 599-8566 Fax: (626) 599-9567

Advantages Hot Deionized Water

Hot DIW Rinse Offers Cleaner Wafers with Fewer Process Steps!

When heated, ultra-pure deionized water (DIW) is much more aggressive and effective in rinsing applications than cold DIW. Pre-diffusion cleaning chemicals and photoresist from wafers are more soluble in hot DIW and therefore more easily removed. Wafer yields are increased, as the process environment is not contaminated with metal ions or other impurities.

Benefits

- Improved removal of chemical residue and particles
- Reduced DIW consumption, and discharge of hazardous chemicals
- Reduces bacterial contamination and improves process yields
- Increased Production throughput
- Uniform process temperature control
- Reduce thermal shock

Hot DIW Cleans Wafers Effectively

Cleaning processes that use sulfuric acid (i.e., pre-diffusion clean and resist stripping) leave residual chemical particles that can affect yields and throughput. Particulates can be produced in as little as 48 hours via the migration and nucleation of the H2SO4 molecules. Undesirable steps to address this problem include:

- Chemical cleaning, i.e., hydrofluoric (HF) rinses and RCA clean processes generate added hazardous chemical waste
- Multiple cold DIW rinses waste costly DIW
- Mechanically agitating wafers in a cold DI bath adds energy to cold wafer rinses using robotics that requires high maintenance

Reduce Use of DIW and Chemical

The molecules in heated DIW possess a higher level of energy than cold water molecules. When transferred to the water surface, the high translational energy of the water molecules quickly dissolves and dilute process chemicals off of the wafers. This dramatically reduces the amount of water needed to effectively rinse the wafers. (e.g., a hot DI rinse at post SO4 locations reduces the total average spin rinse dryer process time needed after the standard rinse cycles from 9 minutes to 30 secs.) In addition, using heated DIW rinsing avoids the need to use hazardous chemicals.

Reduce Bacterial Contamination and Improve Process Yields

Wet process stations are excellent environments for bacterial growth caused by low or intermittent flow of DIW, airborne bacteria, and cross contamination from filters. Heating your DIW to 90° C can sanitize internal plumbing without disassembling station components or using potentially hazardous chemicals. This also eliminates downtime and associated labor costs required for chemical sanitizing. Reducing bacteria contamination improves production yields.

Increase Production Throughput

Heating DIW will result in increased throughput for virtually any process. For example, by utilizing hot DIW cleaning times in wafer boat and box cleaning equipment can be reduced by as much as 60%. Rinse times for wafers that have been processed in barrel reactors can be reduced by as much as 80%. By heating the DIW, it effectively removed fluoropolymer contamination from the wafer surfaces.

Ensure That DIW Temperature Is Constant

DIW temperatures can vary by as much as 10° C depending on location and the season. This undesired variability in water and process temperatures can be avoided by heating the water to a constant temperature. Temperature and humidity in clean are maintained at great expense. Eliminating temperature variations in DIW is as important since DIW will come in direct contact with the wafers throughout numerous processing steps.

Reduce Thermal Shock

Many strip, etch, and develop processes are operated at elevated temperatures. RCA cleaning and silicon nitride etch processes are commonly heated to 45, 140, and 185°C respectively. Transferring wafers from such hot acid environments to a cold 23°C DIW rinse could result in thermal shock and damage the wafers.