# ZEUS Cleaning System

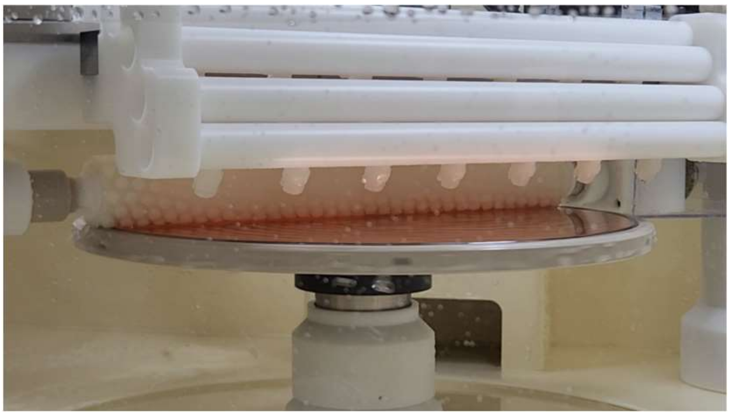
## Semi-Automatic Single Wafer Cleaner

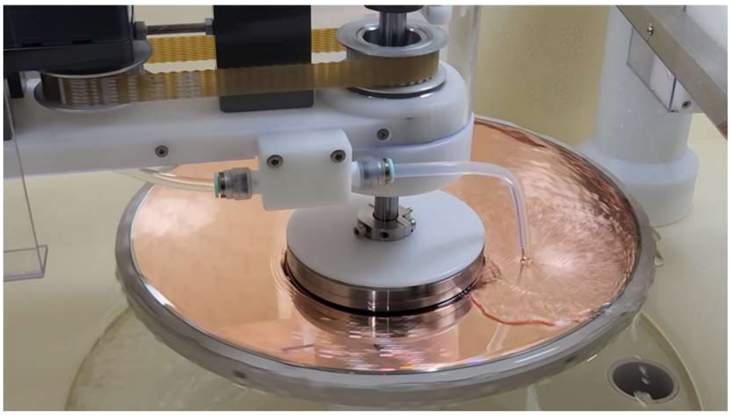
G&P Technology

Chemical Mechanical Planarzation System

## Introduction

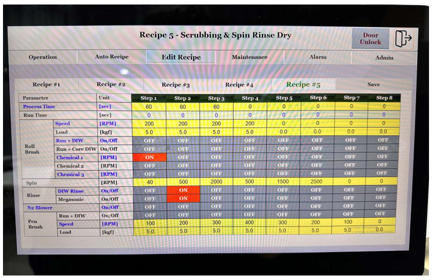
The Zeus cleaning system is an all-in-one type cleaner designed to sequentially perform chemical spray cleaning, megasonic spray cleaning, pad buffing cleaning, PVA brush cleaning, and spin dry processes. Each module can be programmed independently to adjust process parameters via recipes, and the cleaning order can be customized, making it a uniquely designed high-performance wafer cleaner with special capabilities. Particularly effective for particle removal after CMP, the Zeus system allows for the real-time, continuous application of all five cleaning module capabilities, ensuring optimal cleaning performance.





## Features of Zeus Cleaning System

The Zeus semi-automatic single wafer cleaner is comprised of five cleaning modules: Chemical Spray Spin Cleaning, Pad Scan Buffing Cleaning, Megasonic Cleaning, PVA Brush Cleaning, and N2 Spin Dry. These five core modules are housed within a single chamber, designed to allow for the cleaning process to be conducted in any desired sequence by combining these process modules.



Recipe 5 - Scrubbing & Spin Rinse Dry

| Parameter | | Unit | Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Step 6 | Step 7 | Step 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| Process Time | | [sec] | 60 | 60 | 60 | 0 | 0 | 0 | 0 | 0 |
| Run Time | | [sec] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Roll Brush | Speed | [RPM] | 200 | 200 | 200 | 200 | 0 | 0 | 0 | 0 |
| | Load | [kgf] | 5.0 | 5.0 | 5.0 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Run + DIW | On/Off | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | Run + Core DIW | On/Off | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | Chemical 1 | [RPM] | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | Chemical 2 | [RPM] | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | Chemical 3 | [RPM] | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| Spin | | [RPM] | 40 | 500 | 2000 | 500 | 1500 | 2500 | 0 | 0 |
| Rinse | DIW Rinse | On/Off | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| | Megasonic | On/Off | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF |
| N2 Blower | | On/Off | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| Pen Brush | Run + DIW | On/Off | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | Speed | [RPM] | 100 | 200 | 300 | 400 | 300 | 200 | 100 | 0 |
| | Load | [kgf] | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 0.0 |

# Technical Specifications

The Zeus system is capable of cleaning wafers ranging in size from 20mm x 20mm coupon wafers to wafers with diameters up to 300mm, all within a single piece of equipment. This allows for the cleaning of various wafer sizes without the need to change equipment, and the wafers are dried using spin dry after cleaning. Therefore, the cleaning capability can be directly evaluated by measuring the wafers with particle inspection equipment immediately after cleaning. Particularly, since it can clean coupon wafers, it is possible to immediately assess the cleaning performance using AFM after applying new cleaning solutions or new cleaning processes. This flexibility enables the evaluation of cleaning performance without being confined to environments that require Full Scale Particle Counters, which is a requirement for traditional equipment.

## Brush Cleaning

| | |
|---|---|
| Down Force Control | Max 10kgf |
| Wafer RPM | Max 3000rpm |
| Brush RPM Control | Max 400rpm |
| Torque Monitoring | Motor Torque Monitoring |
| Types of Cleaning Solutions | Max 3 Solutions |

## Pen Brush or Pad Buffing

| | |
|---|---|
| Sweep Frequency | Max 30cpm |
| Wafer RPM Control | Max 3000rpm |
| Down Force | Max 5kgf |
| RPM Control | Max 200rpm |

## Megasonic Cleaning

| | |
|---|---|
| Sweep Frequency | Max 30cpm |
| Megasonic Frequency | ~1 MHz |
| Wafer RPM Control | Max 3000rpm |

## Chemical Rinse Cleaning

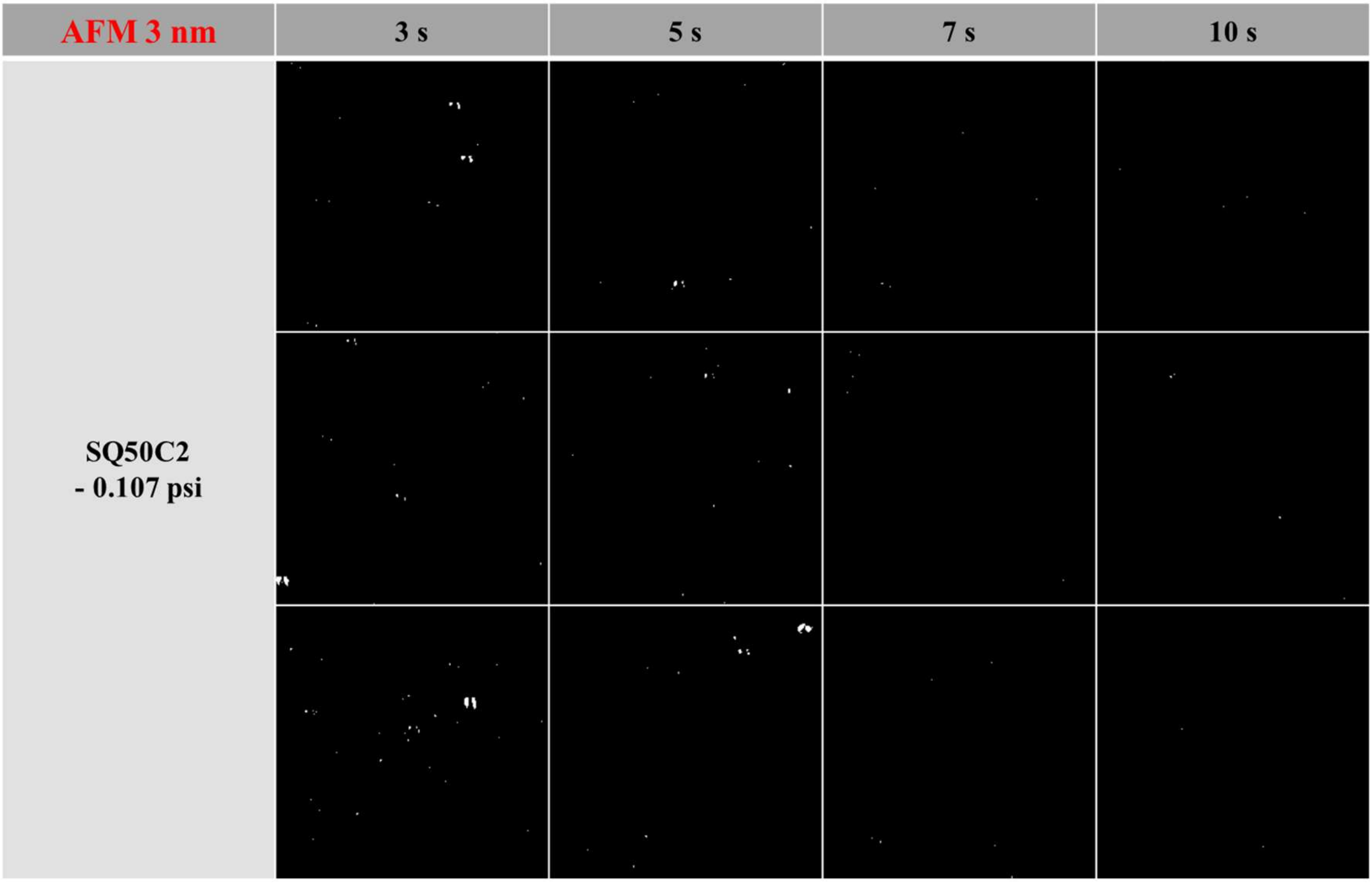
| | |
|---|---|
| Sweep Frequency | Max 30cpm |
| Flow Rate Control | Max 1 liter/min |
| Wafer RPM Control | Max 3000rpm |
| No. of Chemicals | 2 Chemicals |

## Spin Dry

| | |
|---|---|
| Blowing | N2 Blowing |
| Wafer RPM Control | Max 3000rpm, 5sec acc. |

## Process Results

The Zeus cleaning system is capable of performing chemical spray, megasonic cleaning, pad buffing, and PVA brush cleaning sequentially, and allows for the programming of each process parameter according to recipes. This ensures that the best results can be achieved when applying the appropriate cleaning solutions and process conditions to have a very high particle removal capability.



AFM measurement results of particles larger than 3nm in diameter after cleaning of a wafer surface with ZEUS cleaner, Source: G&P Technology

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