

SSEC Trilennium cleaning tool

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Within Philips Research there is always a demand of cleaning a wide range of substrates with the possibility of using different techniques. The Trilennium cleaning tool is a highly flexible tool, which is available in cleanroom WAG at the Campus. The system is equipped with several different cleaning options, and is capable of handling the following variety of round and square substrates: 100 mm, 150mm and 200mm round substrates and 4", 5", 6" and 7" square substrates. Furthermore it can be adjusted to be able to handle any rectangular substrate that consists of a combination of the mentioned square sizes.

1. General

The SSEC Trilennium cleaning tool is a highly flexible apparatus. This flexibility is gained due to the capability of handling various substrate sizes together with 7(!) different cleaning options, which can be utilized in each required sequence. With respect to the substrate sizes this means 100mm, 150mm and 200mm round substrates as well as 4", 5", 6" and 7" square substrates. However by fabricating a new substrate holder it is also possible to handle any rectangular substrate that consists of a combination of the mentioned square sizes.



Figure 1: The SSEC Trilennium Cleaning Tool

2. Configuration

The system is a single-substrate cleaning tool. Basically, it consists of a process chamber, a robot and a cassette load platform. The process chamber is configured with four dispense arms, each with its own cleaning options. These four arms with the accompanying cleaning options are:

- Arm 1: Pre-mixed DI/HF solution
- Arm 2: Point-of-Use mixed 'Piranha' ($\text{H}_2\text{SO}_4/\text{H}_2\text{O}_2/\text{H}_2\text{O}$) and heated DI (up to 95°C). Nozzle is equipped with thermocouple for exothermic reaction temperature feedback.
- Arm 3: Quartz nozzle equipped with an enclosed 1,5 MHz megasonic transducer for dispensing pre-mixed SC-1 solution, DI/NH₄OH-solution and DI water



Figure 2: Arm 3, megasonic clean

- Arm 4: High-pressure (300 - 3000 psi) nozzle with pre-mixed DI/NH₄OH solution.

Besides these four arms a wall-dispense with hot and ambient DI for rinsing purposes, is mounted also. These options are all fully, and independently from each other programmable. All together this provides the tool with the possibility to run approximately 850(!) different cleaning recipes.

The system is also equipped with a real-time End Point Detection (EPD) program. The program operates by comparing the intensities of red, green & blue of a chosen substrate-area with the intensity-data of a reference substrate. When on the substrate the same intensities are measured as the reference-data, the EPD is reached.

This enables us to monitor and control etch processes, drying processes, etc., in fact every process that involves a change of color at the endpoint.

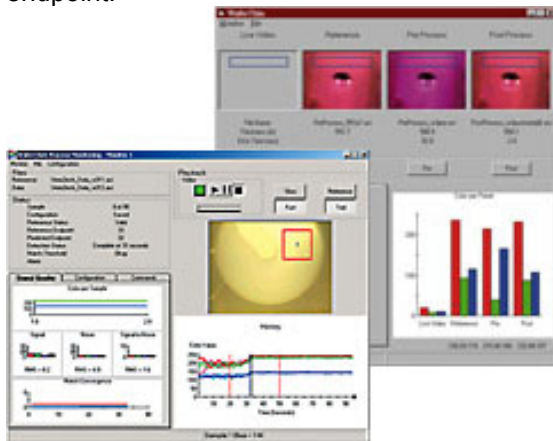


Figure 3: Process monitoring software

Furthermore, for alignment of the substrates there is a non-contact optical controlled alignment system installed. And to control the waist the system has an automatically 3-way drain diverter installed to split the chemicals into acids, bases and 'rest' chemicals.

3. Summary

In summary the SSEC Trilennium Cleaning Tool is a very versatile apparatus, applicable for a whole range of (different) substrates and in many situations where cleaning of contaminants is required. For instance for the removal of oxides, organics, particles, metals, resist residues, etc. etc.