Chapter 4.32

Matrix 106 Resist Removal System
(matrix - 384)

1.0 Title
Matrix 106 Resist Removal System

2.0 Purpose
The Matrix asher Model 106 is a resist removal system designed to effectively remove photoresist (polymer).

3.0 Scope
The system one Model 106 asher incorporates closed loop control of vital process parameters, which in turn eliminate the chances of both thermal and electrical damage to IC device in the circuit.

4.0 Applicable Documents
Revision History

5.0 Definitions & Process Terminology
The asher is a production proven fully automated system which uses pick and place wafer transport system allowing individual wafer selection as well as automatic group ashing of resist coated wafers.

5.1 Main Console Assembly
This console consists of several components most important of which is the Operator Control (interface) Panel and Card Reader Modules, see Figure. The operator control panel displays the following options on the CRT:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAD</td>
<td>Loads Process from data card.</td>
</tr>
<tr>
<td>RUN</td>
<td>Starts the run based on the existing process.</td>
</tr>
<tr>
<td>EDIT</td>
<td>Can be used to edit an existing process.</td>
</tr>
<tr>
<td>SAVE</td>
<td>Saves the existing process (selected process) to data card.</td>
</tr>
<tr>
<td>STANDBY</td>
<td>Puts the machine in the standby state.</td>
</tr>
</tbody>
</table>

5.2 Power Supply Console
- RF Generator
- DC Supply
- AC distribution
- Temp/Pressure Control Assembly
- N₂ distribution Panel

6.0 Safety

7.0 Statistical/ Process Data
8.0 Available Processes, Gases, Process Notes  

The Matrix asher utilizes oxygen as the process gas. Plasma containing pure oxygen at moderate pressures produces species that can attack the organic material in the photoresist to form CO, CO₂ and H₂O. Such bi-products quickly get removed from the surface of the substrate and out of the process chamber leaving the substrate free of photoresist. The oxygen plasma is highly selective and does not attack Si, SiO₂ or Aluminum making it ideal for resist removal application.

9.0 Equipment Operation

9.1 Loading Recipes  

Recipes are stored on thin cards. The standard ash recipe should be available by the machine, unless overwritten by the recipe download procedure. The standard recipe noted below could remove 1 µm of photoresist / minute and is set for total ash time of 1.5 minute. You may alter the time in the recipe to satisfy thicker resist layer requirement, but should be put back to its original state after the run is completed.

**Standard Recipe:**

- **Pressure:** 3.75 Torr
- **MFC1:** 40 Percent
- **MFC2:** 0 Percent
- **MFC3:** 0 Percent
- **RF Power:** 400 Watts
- **Pins:** Down
- **Endpoint:** Timed
- **Chuck:** 250ºC

**Note:** If the chuck is at room temperature, open the front panel door and push the heater reset button. Wait for the chuck temperature to stabilize at set point. If temperature does not rise, report the problem on WAND.

9.2 Recipe Modification  

Recipes can be edited to change the total ash time. Please do not alter the RF total power, unless discussed with a process supervisor. You can enter the edit mode by pressing the key located below the **edit** on operator console (main processing screen). Follow the instruction on the screen and use + and − keys to change the value of selected parameters. More details about current recipe are shown in the appendix section, where the number of warm up cycle (2), start up angle and ignition delays (420 and 1000, respectively), and the bleed time (5) are defined. Please do not change any of these parameters, simply exit out of them if somehow you end up in the edit mode.

9.3 Processing  

1. Enable the Matrix asher on WAND.
2. Check the operator console (CRT) shown in Figure 1 and if in standby mode, then exit by pressing the EXIT key. Wait until chamber is vented and main operating page is displayed.
3. Load your wafers in the designated input cassettes, available at the station (4" or 6").
4. Adjust the cassette receiver (stage) to accept your desired wafers size (4" or 6") by placing the input cassette on the stage and adjusting the knobs shown in Figure 2.
5. Press **Run** in the run option screen.
6. Press **Home** to reset the cassette on the next screen or by the Up and Down key under the move cassette option submenu to position your first wafer in front of the pick and place wafer transport, starting with the lowest desirable wafer slot in the cassette.
(7) Press Auto or single to start the ash process. This will automatically take all your wafers in or one wafer at a time depending on your selected mode of operation.

(8) After you are done ashing, remove the wafer cassette.

(9) Press the standby key to leave the machine in the standby mode with chamber isolated from the atmosphere.

9.4 Descum
You can develop your own descum recipe under staff supervision. Do not alter standard recipe for this application.

10.0 Troubleshooting Guidelines
N/A

11.0 Figures & Schematics

Figure 1 - Operating Console (CRT)
### 12.0 Appendix

**Ash Program (Main Menu)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>3.75 Torr</td>
</tr>
<tr>
<td>MFC1</td>
<td>40 Percent</td>
</tr>
<tr>
<td>MFC2</td>
<td>0 Percent</td>
</tr>
<tr>
<td>MFC3</td>
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<tr>
<td>End Point</td>
<td>Timed</td>
</tr>
<tr>
<td>Chuck</td>
<td>250 °C</td>
</tr>
</tbody>
</table>

**First Sub-Menu**

Press the RUN button on the Main Menu to get to this screen (do not change anything).

Checking recipe for Process
Step1 is Valid
1 Step Process
Second Sub-Menu

Press exit on first sub-menu to get to this screen (do not change anything).

Would you like to change

1. The number of warm up runs?
   Press Warm up button to get to the following menu page.

   How many warm up processes will you wish to run? 2
   Exit

2. The start up angle and ignition delay?
   Press angle & delay button to get to this menu page.

   Start
   Up
   Angle
   420
   - value + value - value + value

   Delay
   Before
   Ignition
   1000

3. The bleed Time?
   Press bleed button to get to the following menu page.

   How many seconds do you want for bleed time? 5
   - Value + Value

S. Parsa - January 2001