



Back Side Reticle Cleaning

Whitepaper by: Gary Hillman
S-Cubed, Inc.
Mars Court
PO Box 365
Montville, NJ 07045-0365
(973) 263-0640
<http://www.s-cubed.com>

Back Side Reticle Cleaning

As geometries continue to shrink the requirements for mask cleanliness, both haze and particulate matter have become increasingly stringent. It is also important to note that when the most advanced lithography tools are used, the backside cleanliness can degrade more rapidly than the imaged and Pelliculized side. Until recently, in order to clean the backside, it has been necessary to remove the Pellicle and clean both sides. Then the Pellicle would need to be remounted. Ultimately, these extra steps create more wear and tear on the image side and requires a rather lengthy cleaning process that can require more reticle sets than might otherwise be necessary. It is clear that a tool that can clean the back side, without in any way degrading the front (Pelliculized side), would be a means of substantially lowering costs of Reticles by enabling rapid turn around of cleaned Reticles to a production role.

Key issues include:

- Clean the back side of haze
- Clean the back side of particles
- Do not endanger the image with possible ESD
- Do not endanger the image side by contact
- Do not endanger the pellicle
- Wet process and dry the backside while maintaining the image Pelliculized side in a dry ambient.

The approaches to resolve the issue addressed in the list above:

- Ozonated DIW for haze removal
- Dual brush types for energetic and dynamic particle removal addresses the entire back side by motorized brushes.
- A patent applied for Reticle chuck the contacts the reticle only at points, ensuring minimal contact.
- A patent applied for Reticle chuck that bathes the Pelliculized side in ionized CDA in order to protect the pellicle and the image.
- Ozonated DIW removes thin organic films that would render the Reticle surface hydrophobic. By removing such films, the surface is Hydrophilic and will ultimately spin dry without any “water spots.”

As mask shops and wafer fabs often dispose the Pellicle up or down, the tool can be provided with a Reticle “flipper.” All material handling is done at the edge only with point contact for cleanliness. All Reticle handling mechanisms are “fail safe,” so in event of a facility failure, the Reticle is maintained in a safe state.

About Mr. Gary Hillman

Mr. Gary Hillman has enjoyed a long and distinguished career in the engineering and semiconductor industries. A graduate of the Georgia Institute of Technology with a B.S. in Ceramic Engineering, Mr. Hillman began his career with Corning Glass Works in Corning, New York.

Mr. Hillman has made multiple critical contributions while working at a variety of companies during his long and successful career, including receiving a patent for the semiconductor industry’s first practical “robotic” wafer handling system while working at Machine Technology, Inc. in Parsippany, New Jersey. Since then, Mr. Hillman has 22 patents to his credit.

Mr. Hillman served as the Chairman of SEMI Standards in 1987 and Chairman of SEMI in 1989.

In 1994, Mr. Hillman and a group of others formed Service Support Specialties, Inc. and Creative Design Corporation. Service Support Specialties, also known as S-Cubed, evolved over time into a leading manufacturer of Photoresist processing tools and associated robotics.

Mr. Hillman has helped to develop significant advances in the engineering and semiconductor industries. He and his dedicated team at S-Cubed work to meet and exceed the needs of their customers.

Whitepaper by: Gary Hillman
S-Cubed, Inc.
Mars Court
PO Box 365
Montville, NJ 07045-0365
(973) 263-0640
<http://www.s-cubed.com>