MEMS Photoresist Process Tools

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

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MEMS processing takes advantage of many techniques utilized in the manufacture of the chip in what is generally called the Front end fo Line (FEOL). While the photolithographic process is discussed in the Back End Of Line (BEOL) white paper it should be noted that there are factors relating to MEMS processing that make the process requirements different from that required of the typical silicon processing.

MEMS devices often employ extremely viscous resists and materials such as SU-8. The dispensing of such materials is very difficult. The issues are:

- Extremely high viscosity of the material.
- Bubble formation and elimination
- Dispense Suck-back or halting

These difficulties often result in the necessity of performing "hand dispense" of the material which is essentially to pour the material directly from a beaker on to the wafer which is not a particularly good way to control a production process.

To solve this and similar problems S-Cubed has developed and applied for a patent on a non-pulsating peristaltic pump. The pump is mounted above the point of dispense and aspirates material directly from a storage bottle or funnel disposed at the input of the pump. Since the pump is peristaltic it operates to both dispense and halt dispense- suck back under servo motor control. The Servo precisely controls both the rate of dispense and the volume of dispense programmatically. By mounting the pump higher than the point of dispense even if a bubble should somehow be formed it tends to rise in the system rather than be dispensed with a "shot" on the wafer. The pump is linear in format and is equipped with a single valve which enables the peristaltic "squeeze roller" to maneuver to begin the next pumping cycle. That valve can be placed anywhere in the dispense path to be effective. This means of dispense coupled with the other features of the Flexi and FotoFab series of tools provides the MEMS maker with a powerful tool for both development and production.

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.

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