microcontrol

electronic

Lamination processes
Background

- At first, lamination techniques were applied (and still in production) in the PCB market to deposit layers of dry photoresist.
- In the semi industry, a lamination process was first introduce in the beginning of the 80’s, to apply a protective tape on the wafer front side, before the back grinding (lapping) operation.
- In 1985, thanks to a cooperation between Microcontrol (MCE) and STM, the first ever built fully automatic BG lamination system, was designed and installed in a production line in Agrate.
- Since then, in the following 2 decades, MCE installed more than 200 BG units, with the major IC makers, worldwide (most of them still in production).
80’s & 90’s
Year 2000’s

• A totally new platform - for BG tape lamination (up to 300mm)- is designed and brought to the market.

• Following the establishment of a business relation with Dupont, MCE starts developing a lamination system to apply dry film photoresist on wafers.

• The Leonardo series is officially released with its 200 & 300 mm platform.

• The installation of a 200mm tool and the following strong cooperation with at the IZM - Fraunhofer Institute - in Berlin, allows MCE to present the full lithographic process to its potential customers, many of them, decided to introduce this new method of applying the photoresist layer.
Leonardo Series front view
Today

As a leading supplier of dry film laminators, MCE is very active in the MEMS market. Particularly our tools laminate dry photoresist for:

- via / micro bump creation
- bumping / pillar creation (up to 120µm)
- wet / dry etching of redistribution conductors

Following a new collaboration with STM, in 2010, a new equipment to laminate conductive die attach film has been developed and already install with a few units.
Leonardo LD4CT Series
Process Performances

LAMINATION SPEED

LAMINATION PRESSURE

Total Process Control

CHUCK TEMPERATURE

ROLLER TEMPERATURE
Following slides are courtesy of:

Fraunhofer Institut
Zuverlässigkeit und Mikrointegration
Experimental results

Resolution capability of 15µm dry film photo resist laminated with Microcontrol Leonardo 200 series

line 3µm space 20µm 40mJ/cm²

line 4µm space 20µm 40mJ/cm²
Dry film for bumping

Process flow: Bumping by electroplating

1. Sputtering of seed layer
2. Dry film resist lamination **Leonardo 200 series**
3. Dry film exposure
4. Dry film development
5. Electroplating
6. Resist stripping
7. Seed layer etching
Experimental results (Multiple lamination)

200mm Si-Wafer (surface 100nm thermal oxide)

Lamination of a 20µm resist film on lamination tool „Leonardo 200“ from MicroControl
Leonardo 200 Lift Off
Metal Lift Off

✓ New method to lift off metal with adhesive tape from wafer
✓ Remove in only one process step all extra unnecessary metals
✓ Microcontrol Electronic offers Leonardo 200 Lift Off System on the market giving the following benefits:

- This method allows the customer to choose solvent free process;
- Even using solvent, there won’t be the need to destroy metal layer to reach photoresist;
- Easier and more environmental friendly method to recycle precious metal waste
Leonardo 200 Lift Off
Microcontrol process step

I. Preparation of the substrate

II. Deposition of the sacrificial stencil layer

III. Patterning the sacrificial layer (ex. etching), creating an inverse pattern

IV. Deposition of the target material

V. Exceeding Target Metal Layer Lift Off

VI. Washing out the sacrificial layer

VII. Final pattern

Layers:
1 – Substrate
2 – Sacrificial Layer
3 – Target Metal Layer
4 – Adhesive tape
Microcontrol Electronic DLOxxxMA

Special tape developed specifically for Lift Off process available in all wafers sizes
Customers base

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