

LIQUID COMPRESSION MOLDING SOLUTIONS

RUUD DE WIT, MAY 2025
(EXTERNAL USE)

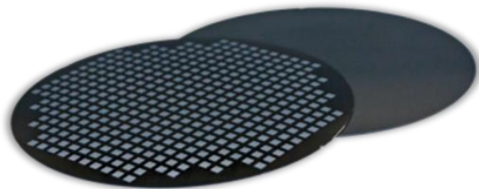


HENKEL LIQUID MOLDING MATERIALS

PACKAGING SOLUTIONS

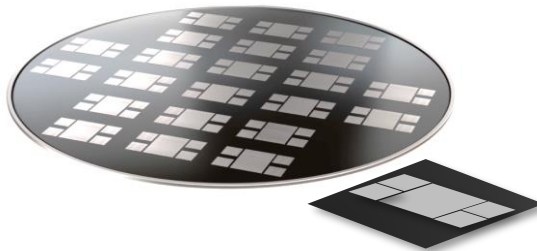
Liquid Compression Molding

FOWLP



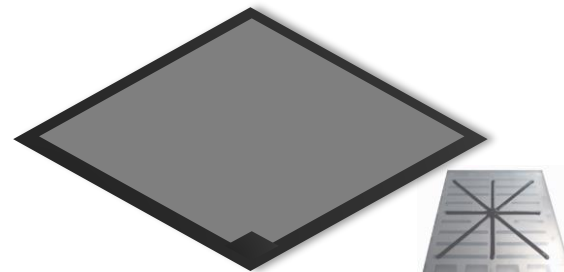
- **Liquid Compression Over Molding** Process
- **Printing** Process

2.5D & 3D



- **Liquid Compression Underfill (L-MUF)** Process

PLP

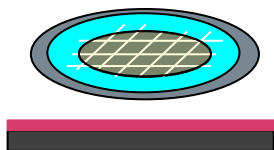


- **Liquid Compression Panel Molding** Process

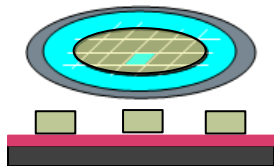
HENKEL LIQUID MOLDING MATERIALS

TYPICAL FAN-OUT WLP PROCESS (DIE FIRST)

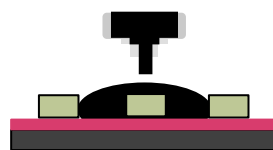
Thermal Release Tape *) on Carrier



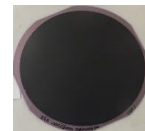
Die P&P on Carrier



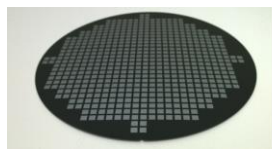
Dispensing on Die



Compression Molding & Post Mold Cure (PMC)



Remove Carrier



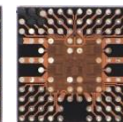
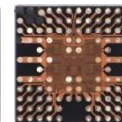
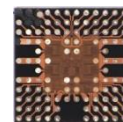
Back Grinding



Redistribution Layer (RDL)



Ball Mount & Singulation



*) HENKEL recommends **MITSUI ICROS®** thermal release tape for high die shear strength with **lowest peel strength** during de-bonding at 120°C



HENKEL LIQUID MOLDING MATERIALS

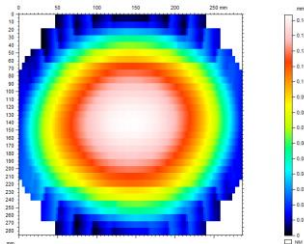
KEY BENEFITS, VALUE PROPOSITION

Ultra-low warpage

Ultra-low warpage

on Wafer and Panel level

Stable warpage during
post processing (incl. RDL, PI)



Sustainability

REACH compliant

(SVHC/anhydride free)

PFAS free formulation

(no **perfluoroalkyl** substances)



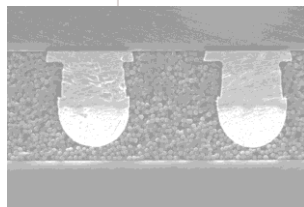
Gap filling

Gap filling

capable of Underfilling

Low filler cut

for thin gap height

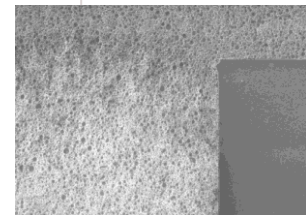


Reliability

Passing MSL2a

and TCB X1000

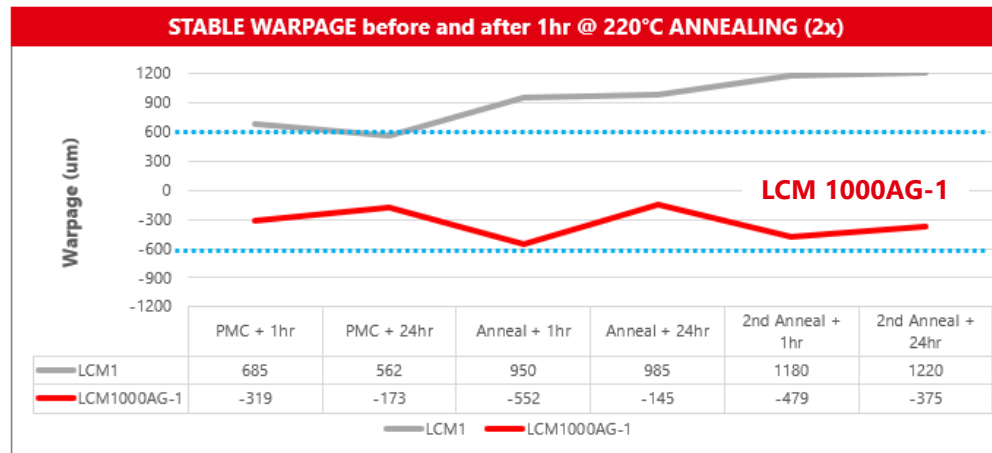
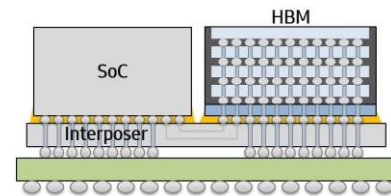
(-55°C to 125°C)



HENKEL LIQUID MOLDING MATERIALS

2.5D OVER MOLDING WITH LCM 1000AG-1

- LOCTITE® ECCOBOND **LCM 1000AG-1** is a fine silica filled (<10um) wafer level encapsulant developed for over molding of high density and large body 2.5D IC's
 - Outperforming incumbent Japanese competition by its ultra-low warpage (CTE1 <8ppm)
 - Passing typical reliability tests (MSL3, TC-B 1000 cycles, HTS 500 cycles, uHAST 264hrs)
 - SVHC (anhydride) and PFAS free formulation
 - Dk ~3.5 (dielectric constant) and Df ~0.01 (dissipation/loss factor) @ 60-170 GHz range
 - Low warpage PANEL level processing demonstrated at TOWA Japan



8" x 600um wafer + 200um mold cap

Henkel

HENKEL LIQUID MOLDING MATERIALS

LCM 1000AG-1 TECHNICAL DATA SHEET

PRODUCT DESCRIPTION

LOCTITE® ECCOBOND LCM 1000AG-1 provides the following product characteristics:

Technology	Epoxy amine system
Appearance	Black liquid paste
Product benefits	• High purity • Low stress, ultra-low warpage • REACH compliance • Robust reliability
Cure	Heat cure
Application	Semiconductor encapsulant
Typical assembly / Package application(s)	• Liquid compression molding for WLP • Over-mold LCM for FO-WLP

LOCTITE® ECCOBOND LCM 1000AG-1 is formulated for use in liquid compression molding process with low stress, exhibiting ultra-low-warpage during wafer-level process, and showing excellent chemical resistance and thermal stability properties.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Viscosity, Rheometer, DHR-2 @ 25°C, 0.158 s ⁻¹ , Pa.s (cP)	800
Thixotropic index, Rheometer, DHR-1 @ 25°C	1.7
Specific gravity, Densometer, g/cm ³	1.92
Filler content, TGA, wt%	84
Filler particle size, µm	
• average	3
• maximum	10
Shelf life @ -40°C, days	365

TYPICAL CURING PERFORMANCE

Liquid compression molding	
in-mold-cure (IMC)	300 ~ 600 sec @ 120°C
post-mold-cure (PMC)	1 hour @ 150°C

The above cure profiles are guideline recommendations. These conditions (time and temperature) may vary based on customers' experience and specific application requirements, as well as customer curing equipment, oven loading and actual oven temperatures.

TYPICAL PROPERTIES OF CURED MATERIAL

Sample cured 1 hour @ 150°C.

Physical properties

Coefficient of thermal expansion, TMA, ppm/°C	
Below Tg	8
Above Tg	18
Glass transition temperature, TMA, °C	135
Storage modulus, DMA @ 25°C, GPa	19
Extractable ionic content, ppm	
Chloride (Cl ⁻)	1.5
Sodium (Na ⁺)	0.3
Potassium (K ⁺)	< 0.1
Warpage after PMC, 1 hour @ 150°C, µm	
200 µm thick LCM, 8" diameter, 600 µm thick wafer	< 100

- LOCTITE® ECCOBOND **LCM 1000AG-1** is available in 250g filled 12OZ Semco cartridge (IDH 3037654)

THANK YOU

Feel the power of our partnership

- Partner with our passionate people
- Experience our expertise

<https://next.henkel-adhesives.com/de/en/industries/semiconductor/semiconductor-packaging.html>

