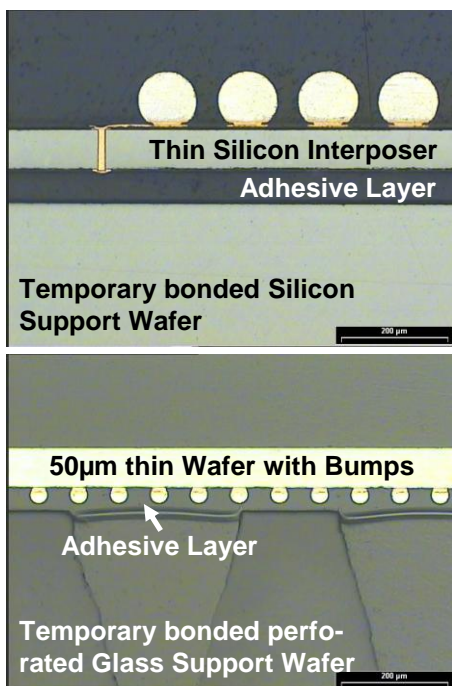




Fraunhofer

IZM

Temporary Wafer Bonding for Wafer Thinning and Thin Wafer Back Side Processing



Fraunhofer Institute for Reliability and Microintegration IZM

Gustav-Meyer-Allee 25,
D – 13355 Berlin
Germany
Internet: www.izm.fraunhofer.de

Project Coordination

Kai Zoschke
Phone: +49 (0) 30 / 464 03- 221
e-Mail: zoschke@izm.fraunhofer.de

Department: HDI & WLP/ASSID

Head: Oswin Ehrmann
Phone: +49 (0) 30 / 464 03 - 124
Fax: +49 (0) 30 / 464 03 - 123
e-Mail: ehrmann@izm.fraunhofer.de

Head: M. Juergen Wolf
Phone: +49 (0) 351795572- 12
Mobile: +49 (0) 30 46403-606
e-Mail: wolf@izm.fraunhofer.de

The continuous trend towards miniaturized and multifunctional electronic products is not only enforcing a lateral size reduction of electronic components, but also a reduction of volume and component height. Thus fabrication of ultra flat devices and stacked architectures is becoming more important ever.

In this context technologies for extreme wafer thinning, thin wafer handling and thin wafer backside processing as well as assembly strategies for thin components are imperative to enable 3-dimensional system architectures based on Through Silicon Vias (TSVs).

Fraunhofer IZM is focusing its research on temporary wafer support systems. Those systems, which enable extreme thinning as well as back side processing of thin silicon wafers, are based on adhesive wafer to wafer bonding of a carrier wafer to the device wafer.

Such systems enable the reliable support of thin wafers during standard processes as CVD and PVD, lithography, wet and dry etching, electroplating and polymer curing as well as an easy de-bonding of the temporary support wafer from the device wafer after final processing including a residue free adhesive removal.

Due to the special design of carrier wafer, adhesive and de-bonding equipment different release mechanisms are possible to finally separate both wafers from each other after the processing was finished. Basic methods are solvent release without heat, slide-off release at elevated temperatures and laser

release using a transparent carrier. All methods have their particular pros and cons and are evaluated carefully also in correlation with the corresponding kind of customer wafer to be bonded and de-bonded with them.

Based on the configuration of the customer wafer (topography, thickness, kind of processes to be applied) as well as the subsequent second level assembly of the components, the most suitable handling concept and wafer support system can be chosen.

Even the cascaded use of the same support system or the combination of different style temporary wafer handling systems is possible to enable thin wafer transfer bonding.

IZM uses temporary wafer support systems for the following applications:

- Extreme thinning and stress relief of silicon wafers with different type of front side topography
- Back side processing of thin wafers with different front side topography including isolation / passivation, high density redistribution, contact formation
- Multiple thin wafer transfer to enable alternated front and backside processing
- Chip to thin wafer assembly
- Temporary support of thin chips during assembly
- Stacking of thin components at wafer level and component level