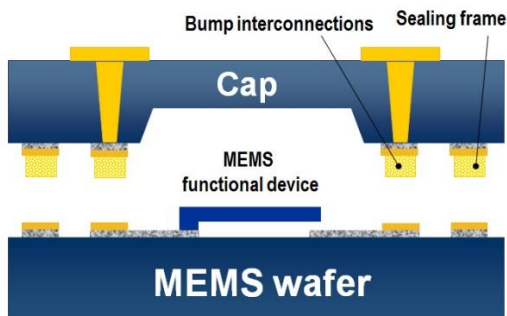


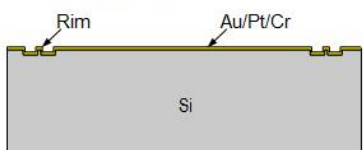
# Hermetic Seal Bonding at Low Temperature with Sub-micron Au Particles

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T. Ogashiwa, K. Totsu, M. Nishizawa, H. Ishida, Y. Sasaki, M. Miyairi, H. Murai, Y. Kanehira, S. Tanaka, M. Esashi, "Hermetic Seal Bonding at Low-temperature with Sub-micron Gold Particles for Wafer Level Packaging", in Proc. of 48th Interbational Symposium on Microelectronics (IMAPS), Orlando, Florida, USA, October 26-29, 2015, pp. 73-78.

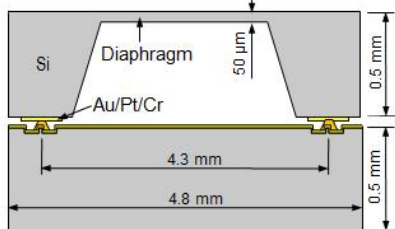
(a) Formation of a rim structure in 10 μm width by dry etching process.



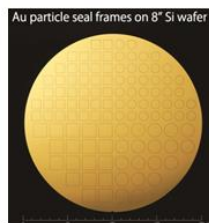
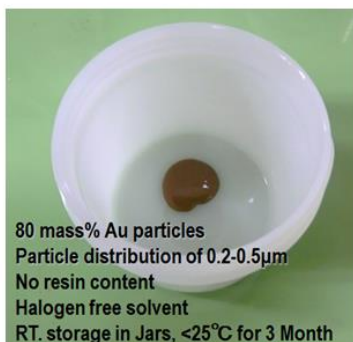
(b) Printing with Au paste and sintering at 200°C/2h in Ar-4%H<sub>2</sub>.



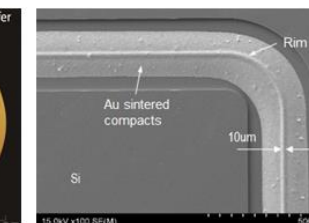
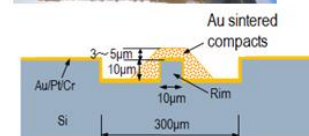
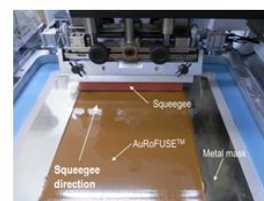
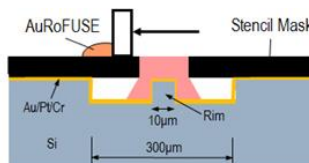
(c) Thermo-compression bonding at 200°C/30min under a pressure of 200MPa for the rim.



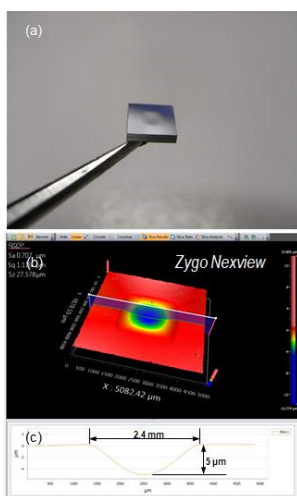
Wafer Level Hermetic Sealing Process



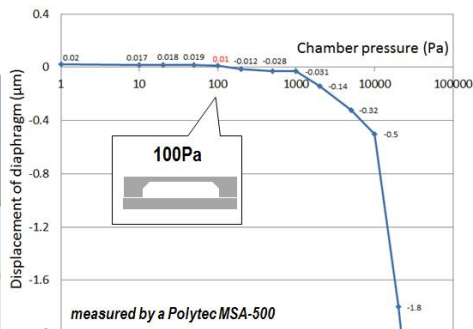
Appearance of Au Paste for Stencil Printing (AuRoFUSE™)



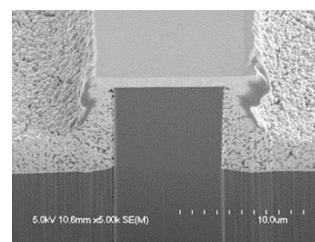
Formation of Au Sintered Compacts by Stencil Printing



Bonding of Wafer with a thin diaphragm



Displacement of Diaphragm Measured at Different Chamber Pressures



Cross-sectional SEM Image of Hermetic Rim Joint

Exposure time in He	Before exposure	After exposure		
		< Dwell time >		
72 hours	2.91E-15	1.52E-12	1.99E-13	1.09E-14
0.617MPa(abs)		< 17 min >	< 392 min >	< 1706 min >
Empty chamber	4.82E-15	4.97E-14	2.46E-14	5.37E-15

He leak rate : 10<sup>-14</sup> Pa·m<sup>3</sup>/s (He)

Measurement Results of He Leak Rates