Introduction
A novel packaging platform for the integration of sensors, actuators, fluidic and optical elements together with electronics into a single package is being developed.

Silicon direct wafer bonding to low CTE LTCC has been investigated.

Conclusions
- Silicon and LTCC show similar behaviour when used for packaging (low pressure inside the package) while glass tends to be poorer.
- The new low CTE LTCC technology opens up the possibility of direct bonding between MEMS wafers and LTCC substrates.
- The prospect of using LTCC as substrate allows for cheaper chip/wafer scale packages, which in turn can become an essential factor in bringing MEMS products to a mass-market.

Simulation
- Static deformation results from ANSYS using SOLID92 hexahedral elements.
- Anodic bonding at 420ºC.
- The thickness of the wafers is 300 µm and 500 µm for silicon and LTCC/glass respectively.
- The stress was evaluated at room temperature.
- Vacuum sealing has been simulated in the case of cavities in the middle silicon wafer.

Experimental
- The new low CTE LTCC material gives the opportunity of direct wafer bonding to silicon.
- The material contains alkali ions which allows for direct anodic bonding to silicon.
- 2” low CTE LTCC wafer was bonded to silicon by standard anodic bonding at 420 ºC, 800 V and a few seconds.

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Contact
Katrin Persson
Imego AB, Arvid Hedvalls Backe 4
SE-411 33 Göteborg, Sweden
E-mail: katrin.persson@imego.com
www.imego.com