

Structured glass substrates for packaging of electronic components

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The semiconductor industry is gradually approaching the end of Moore's law. Which means that reducing the structure size on the silicon chip will stop to be the largest leverage to shrink the size of electronic components. Instead, heterogeneous packaging of active and passive components is becoming a major focus to maximize performance, optimize yield and shrink the size of electronic components. There are several material platforms for packaging like epoxy moulds, silicon wafers, advanced PCB materials or LTCC. But also, glass based packages are of interest for the industry and have a number of advantages. Glasses form a stiff substrate, which allows redistribution layers (RDL's) with single micrometer accuracy. Glasses, adjusted with their thermal expansion, enable packages, which handle high thermal loads. Glasses can be structured with thousands of cut-outs for fan-out embedding of semiconductor components of passive components. Glasses are available at panel size, which can bring in a large cost advantages for larger packages. The dielectric properties of glasses allow building conductive connections with short delay times, low parasitic capacitances and good high frequency properties. Also, special glasses can be developed with minimized losses and with particular low dielectric constants for GHz applications like antenna in package concepts where even antenna arrays have to be integrated. In the current work we review the state of glass panel based packaging including industrial readiness over the whole process chain and show examples where glass has already shown its usefulness in packaging.