

## Co-firing of low-K and middle-K dielectric layers in LTCC

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### **Abstract**

Low temperature Co-fired Ceramic (LTCC) technology is expected to become crucial for future microwave applications such as IC packaging radar, antennas, and wireless technologies. For realization of the highly integrated and multi-functioned LTCC module, it is required to integrate middle- and high-permittivity dielectric layers as well as low-K dielectric layers into one module by co-firing. In this study, we developed various low-K (5.5 8.0) and middle-K (20 60) dielectric systems the chemical compositions of which are designed carefully considering the chemical and physical matching during co-firing. We will present about the thermal shrinkage, warpage, and delamination between the hetero-layers. The chemical and physical stabilities of the interfaces between low-K and middle-K layers will be described. Chemical reactions between the dielectric layers and Ag inner conductor will also be discussed.