

Structure and Properties of Polymer Infiltrated Alumina Thick Film via Inkjet Printing Process

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Abstract : Modern industry has focused on processing that produce low-loss dielectric substrates used complex micron-sized devices using thick film technologies such as tape casting and slip casting. However, these processes have inherent disadvantages fabricating high density interconnect with embedded passives for high speed communication electronic devices. Here, we have successfully fabricated porous alumina dielectric layer infiltrated with polymer solution by using inkjet printing process. Alumina suspensions were formulated as dielectric ink that were optimized to use in inkjet process. The layer was confirmed by field emission scanning electron microscope (FE-SEM) for measuring microstructure and volume fraction. In addition, the reaction kinetics and electrical properties were characterized by FT-IR and the impedance analyzer. The volume fraction of alumina in porous dielectric alumina layer is around 70% much higher than that in the conventional process. Furthermore, after infiltration on the dielectric layer using polymer resins such as cyanate ester. Excellent Q factors of the dielectric is about 200 when confirmed by impedance analyzer without any high temperature process.