

# Low-temperature thick-film dielectrics stabilised by a nanocrystalline powder

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## Abstract

In this work, a low-temperature thick-film dielectric consisting of a high-lead low-temperature glass stabilised by nanocrystalline oxide powders is characterised. Its purpose is to enable deposition of thick-film electronics onto substrates such as glass and metals (steel, aluminium, brass, titanium), which cannot be exposed to the standard high-temperature 850 C thick-film firing cycle. In this work, the sintering behaviour, and the resulting structure and dielectric properties are analysed, for different glass and filler compositions and grain sizes. Upon firing, the dielectrics undergo liquid-phase sintering, accompanied by chemical reaction between the glass and the filler which are dependant on their respective compositions. We show that reactivity is improved by the use of nanoscale powders, and that glass-powder chemical reactions can be used to yield stabilised dielectrics with improved insulating properties, onto which further layers such as conductors and resistors can be deposited.