

# **Electrophoretic deposition of lead zirconate titanate films on metal foils for embedded components**

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## **Abstract**

PZT thick films in the thickness range of 5 to 200  $\mu\text{m}$  on 20 $\mu\text{m}$  copper and 25 $\mu\text{m}$  platinum foils are prepared by electrophoretic deposition (EPD) for application as embedded passive components. The EPD process is conducted in non-aqueous media and the effects of deposition parameters, such as dc voltage values, processing times and suspension aging on the film thickness and composition stoichiometry are evaluated. The dependence of the film thickness on the current and aging of the suspension is established and related with the chemical modifications occurring in the suspension. Films sintered at 1150°C for 30min exhibit uniform and dense microstructures with an average grain size of 1.5 $\mu\text{m}$ . A dielectric permittivity of around  $\sim 1330$  and loss tangent of 0.05 are measured for films with 8 $\mu\text{m}$  of thickness. The films show remanent polarization and maximum polarization value of 24 $\mu\text{C}/\text{cm}^2$  and 37.7 $\mu\text{C}/\text{cm}^2$ , respectively. These properties, comparable with those of bulk PZT ceramics, suggest potential applications of the EPD process for the deposition of ferroelectric thick films on metal foil for embedded component applications.

**Key words:** EPD, PZT, thick films, aging time, dielectric properties, ferroelectric properties, embedded components