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LETTERS

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Fabrication of 0–3 Piezoelectric-Glass Composites

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Piezoelectric 0–3 glass composites for high temperature and wide area applications were developed by firing a mixture of modified $PbTiO_3$ and lead-based glass powder. Sintering of the 0–3 piezoelectric composites was dependent upon the firing temperature and the amount of glass phase. Piezoelectric 0–3 composites with 41–72 vol% ceramic, fired at 450°C, showed dielectric constants, K, ~45–100, piezoelectric g_{33} coefficients ~13–20 × 10^{-3} Vm/N and piezoelectric d_{33} coefficients ~5–15 × 10^{-12} C/N which were found to be comparable to those of polar glass-ceramics.

1. Introduction

Electroceramic composites are frequently designed to provide the desired electromechanical properties through the combination and connectivity of different phases.[1–9] Design concepts of numerous electroceramic composites have been well documented.[2] Fabrication and characterization of piezoelectric composites, which are based on polymer and piezoelectrically active ceramic particles such as pure or modified $PbTiO_3$ and PZT, have been reported.[4–7] Such composites which possess the 0–3 connectivity, i.e., piezoelectrically active ceramic particles are dispersed in the 3-dimensionally interconnected polymer phase, offer many advantages such as easy processing of various shapes, i.e., sheets and fibers, flexibility and high hydrostatic piezoelectric coefficients. Effects of piezoelectric ceramic content, particle sizes of the piezoelectric ceramic and poling conditions on the 0–3 composite properties have been investigated.[6,7] However, the application of these polymer

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