

Fabrication of piezoelectric laminate for smart material and crack sensing capability

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Abstract: Piezoelectric laminate composite has been successfully fabricated as a smart material by a spark plasma sintering process. Fully or nearly fully dense BaTiO₃/MgO (pre-sintered)/BaTiO₃, BaTiO₃/MgO with 10 vol% BaTiO₃/BaTiO₃ laminates were sintered at 1300 °C with a holding time of 5 min under a pressure of 35 MPa. From EDS analysis, no reaction between BaTiO₃ and MgO layers was observed along the interface. Effects of cycle stress and stress intensity factor on the voltage response of the proposed laminates were investigated for confirmation of a crack detecting capability. The resultant relationship between crack length and voltage response range clearly showed that the proposed laminates have a crack sensing capacity.