

Presented at isaf-ecapd 2010, 9-12 August, Edimburgh 2010

Preferred presentation

Oral Poster

Tape cast PZT material with porosity gradient

C. Galassi, E. Mercadelli, A. Sanson

National Research Council - Institute of Science and Technology for Ceramics
CNR-ISTEC

Via Granarolo, 64, I-48018 Faenza (ITALY)

Corresponding author: carmen.galassi@istec.cnr.it

Functionally graded porous Nb-doped PZT material (PZTN) was produced by addition of pore forming agents and tape casting [1]. Stacked layers with different content of carbon black (CB) were co-fired and a porosity gradient was obtained. Tailoring the binder to plasticizer volume ratio of each single green layer (Fig.1), gradually increasing CB content and adjusting the binder burnout procedure are the critical issues to eliminate cracks and delaminations and develop crack-free porosity-graded multilayer with porosity ranging from 10 to 30 vol% (Fig. 2). A load applied during the heating treatments was required to obtain a warpage-free, 400 μm thick, planar multilayer specimen [2]. Layers with different pore former content show different shrinkage values that can cause delamination or warpage during sintering. These differences are reflected in strain rate mismatch and can be influenced by the layer thickness and viscosity ratio. The piezoelectric properties of these materials are suitable for ultrasonic applications.



Fig.1 Green tape

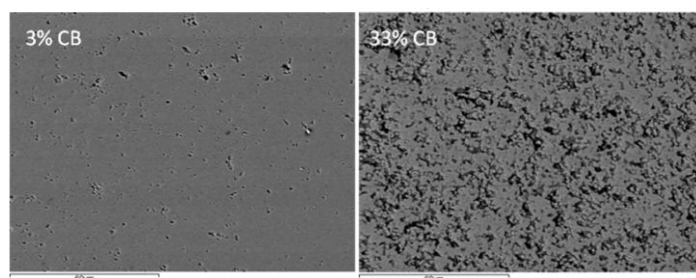


Fig. 2 SEM image of the sintered PZT material with different additions of carbon black

References

- [1] E. Mercadelli, A. Sanson, P. Pinasco, E. Roncari, C. Galassi Tape cast porosity-graded piezoelectric ceramics *J Eur. Ceram. Soc.* 30 (2010) 1461–1467
- [2] Rishi, R., Co-fired Multilayer ceramic tapes that exhibit constrained sintering. United States Patent 5102720A, 7 Apr. 1992.