

Progress on Commercial PZT Thick Film for Integrated and Miniaturised Devices

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ABSTRACT

The development towards smaller devices with more functions integrated calls for new and improved manufacturing processes. The screen-printing process is quite well suited for miniaturised and integrated devices, since thick films can be produced in this manner without the need for further machining. However, the process of screen printing PZT thick films (TF) involves potential problems of thermal matching and chemical compatibility at the processing temperatures between the functional film, the substrate and the electrodes. In order to solve these problems, a compromise between the lowering of the sintering temperature and the conservation of the properties has to be made.

PZT TF devices often exhibit poor performance due to the reduction of piezoelectric response in the PZT TF. This problem is addressed with InSensor TF2100 which exhibit good performance and good compatibility between the PZT TF, the electrodes and substrate material. Using the relative permittivity as a quality parameter the performance of this material is verified. The results are compared with the density of the film indicating that the reduction of the properties in the PZT TF is due to porosity. Other properties of the film such as thickness coupling coefficient and d coefficients have also been evaluated and indicate very good performance of the film.

The functionality of the material is demonstrated in an integrated PZT TF and MEMS accelerometer which exhibit excellent performance.

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