

Commercial PZT Thick Film for Integrated and Miniaturized Devices and High Frequency Ultrasound

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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. We present InSensor TF2100 as a PZT TF material which exhibit good performance and good compatibility between the PZT TF, the electrode 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. Two applications where the material is used will be presented. The first device is a micro machined accelerometer which is realised using silicon technology and TF2100. The second device is a high frequency transducer with excellent performance, which can be manufactured at a very low cost. As the TF technology enables integration of active layers, these devices are well suited for high volume mass production.

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