

Focused high frequency lead-free transducers based on piezoelectric thick films

Karsten Hansen, Konstantin Astafiev and Tomasz Zawada

MEGGITT A/S, Ferroperm Piezoceramics, Hejreskovvej 18A, 3490 Kvistgaard, Denmark

Key words: Lead-free piezoelectric thick films, Potassium sodium niobate ceramics, Ultrasonic transducers

ABSTRACT

Lead-based piezoelectric materials such as lead zirconate titanate (PZT) are the most widely used materials nowadays in the market for piezoelectric applications and the substitution of lead with lead-free materials will make the lead-free transducers very attractive for medical applications due to the biocompatibility and therefore suitable for various applications including implants or intra-body diagnostics. Investigations have shown that modified potassium sodium niobate (KNN) solutions are promising substitutes although not all properties at present are fully matching those of PZT.

The latest progress and development of lead-free high frequency transducers based on piezoelectric thick films is presented (>10 MHz). The deposition of the lead-free material on the focused substrates was carried out by pad-printing. The focused high frequency lead-free transducers have been fabricated and characterised. The performance is measured by pulse-echo setup and is compared with flat high frequency lead-free transducers and lead-based transducers, and the results suggest that the lead-free high frequency transducers may serve as a substitute to lead-based transducers in medical applications.