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TITLE: HIGH-PERFORMANCE ULTRASONIC TRANSDUCERS BASED ON PMN-PT SINGLE CRYSTALS FOR NDT OF AEROSPACE MATERIALS

ABSTRACTS

Ultrasonic transducers for NDE applications are commonly based on Lead Zirconate Titanate or PZT, an inorganic compound and ceramic perovskite material. Until now the advantages of PMN-PT are used in medical applications, but are not implemented in NDE. For applications with low signal amplitudes, high electronic noise and small transducer elements, the performance of ultrasonic probes can be significantly enhanced by using Lead Magnesium Niobate-Lead Titanate (PMN-PT) instead of PZT. This single-crystal material offers significantly better piezo parameters and leads to a higher sensitivity and larger bandwidth. There is a better depth resolution possible with these transducers as practical tests have shown. Similar to PZT it can also be fabricated in 1-3 piezocomposite technology. In a cooperation between Fraunhofer IKTS and Ibule Photonics, PMN-PT ultrasonic transducers are developed and optimized. The performance of phased array probes and single element transducers was measured by a so called PCUS® pro electronic front end from Fraunhofer and compared with equivalent PZT-based probes. As a result various single element and phased array transducers with improved performances are available for NDT of typical aerospace materials and applications.

KEYWORDS

Ultrasonics | Transducers | PMN-PT | Single Crystals |