

Materials Science & Engineering Doctoral Defense

Physio-chemical Characterization of PZT based ultrasonic transducer stack

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abstract

PZT transducers and VO₂ thin films are widely used in various areas of modern technologies such as medical technology, mechanical and automotive engineering, aerospace industry, etc. Therefore, it is necessary to employ advanced characterization techniques to study their material properties to understand the failure mechanisms, validate growth techniques, or factors affecting their properties. Failed PZT transducers in medical instruments are studied and the causes leading to failures are identified and suitable remedies are recommended. The approach is to use multiple characterization techniques to understand the material properties of transducers at different manufacturing stages and thereby identifying the cause of failures. The techniques employed to characterize the materials are XRD, XPS, TEM/STEM, EPMA-WDS, TGA/DTA, CHN analysis, SEM-EDS.