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Abstract

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Polar PZT ceramics are known as materials with excellent piezoelectric and pyroelectric properties preserved in PZT films. A good technological compatibility with modern Si-based electronics makes PZT films be a leader in creation of elements of FERAM's, MEM's, and IR-sensorics. Pyroelectricity is well known as both an important applicable effect and high informative method of polar state investigation. We present the results of investigation of pyroelectric response (U) external voltage (V) loops of polarization reversal (U-Vloops), U-Vpoling curves and U-t time repoling curves and also dynamic current-voltage (I-V) curves of Pt/PZT-film/Pt-Ti/Si-substrate structures prepared by RF sputtering method. Pyroelectric response amplitude and phase behaviour was investigated by photopyroelectric modulation method. From pyroelectric response variation in the current and voltage modes the capacity-voltage loops of polarization reversal and capacity-voltage poling curves were derived. The existence of polar and poling asymmetry of U-Vcurves and also charge and current polarization reversal loops, polar and weak poling asymmetry of U-Vloops together with pronounced asymmetry of I-Vcurves, poling and significant time asymmetry of U-tcurves were revealed. The data are discussed in the terms of mixed 90o- 180o- domain structure reversing and opposite domain system growth and development under condition of emissive (injection) asymmetry of the electrodes, asymmetry of profile of the space charge connected with the profile of mobile and immobile point and extended defects (VPb+ and VO, domain walls, grain boundaries) and also of distortions of different types in the under-surface regions of the electroded PZT-film on Si-substrate.