

FERROELECTRIC CERAMICS FOR Z5U MULTILAYER CAPACITORS

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The interest for ferroelectric materials is in fast expanding worldwide due to their large range of applications such as capacitors, sensors, piezoelectric actuators, pyroelectric infrared detectors, electro-optical modulators.... Nowadays, ferroelectrics become the "heart" of "smart" systems with high levels of intelligence thanks to the success in thin film deposition techniques. In the race for manufacturing better and better computer memories, the BaTiO₃ derived ceramics are very attractive for the development of Ferroelectric Random Access Memories (FRAMs). In this work, we present new ferroelectric phases belonging to the systems Ba_{1-x}M_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x} (M=Ca or Pb). These oxifluorides are potential candidates for the fabrication of class Z5U multilayer capacitors.

Several mixtures of Ba_{1-x}M_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x} were prepared from BaTiO₃, MF₂ and LiF powders. The samples were then shaped to pellets by isostatic cold-pressing and sintered by the conventional solid state route on zirconia's plates at 900 or 1000 °C for 1, 2 or 4 hours in free air. X-ray powder diffraction patterns were collected at room temperature on crushed ceramics and SEM observations were performed on fractured ceramics. Dielectric measurements were carried out as a function of temperature (150K ≤ T ≤ 450K) and frequency (50Hz ≤ f ≤ 40MHz).

All the ceramics exhibit a very broad ferroelectric phase transition in the temperature range 263 - 328K, the ϵ'_r - T curves being compatible with the Z5U class of capacitors. Furthermore, a dielectric relaxation occurs around 10 MHz in these oxifluorides.