Synthesis and Properties of new Phases in the System CaTiO3-NaF-MgF2

Djahida Talantikite
University Abderrahmane Mira - Algeria

Abstract

The perovskite ceramic materials ABO3 are in huge expansion in the world. They play a fundamental role in various industrial applications because of their piezoelectric, pyroelectric and ferroelectric properties. Moreover, the recent processing development of thin films and the rapid advances in the silicon technology and the integrated circuits induced a more and more request of dielectric ceramics. The research in this field has seen an exceptional growth since a decade. Among these materials, we have been interested by the calcium titanate. Recent studies on the system CaTiO3 lanthanum oxides and CaTiO3 actinum oxides show the important role that the calcium titanate plays in the treatment and the storage of nuclear waste. Further more, CaTiO3 and its derivatives are used in hydrocarbon catalyse. Our objectives are to prepare new oxyfluoride materials belonging to the CaTiO3 NaF MgF2 system and to study their structural, dielectric and calorimetric properties. Oxyfluoride phases have been synthesized in free atmosphere, using the CaTiO3 perovskite and the fluorides NaF and MgF2 , according to the solid state reaction :

(1-x) CaTiO3 + x NaF + xMgF2 Ca1-x Nax(Ti1-xMgx) O33x F3x

The purity of CaTiO3 and oxyfluorides has been checked by XRay diffraction(XRD) . The crystalline parameters have been determined then refined by the least square method. The phase transitions in these new phases have been investigated by dielectric measurements and differential scanning calorimetry (DSC).