# STRUCTURAL, THERMAL AND DIELECTRIC STUDIES OF THE SOLID SOLUTION $Ca_{1-x}Sr_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x}$

**L. TAÏBI-BENZIADA**

*Laboratoire des Sciences des Matériaux, Institut de Chimie, U.S.T.H.B., B.P. 32 El-Alia, 16111 Bab-Ezzouar, Algiers, ALGERIA*

Dielectric ceramics are of increasing importance as the electronic industry is in fast expanding worldwide. Obviously, there is an urgent need for new technical ceramics with small size and appropriate characteristics at reduced costs to be competitive on the huge market of electronic circuits. At present, titanate compounds are intensively studied because they have numerous properties that make them interesting for capacitors, piezoelectric devices, resonators, optical memories, laser technology…Our research is mainly devoted to the preparations and characterizations of novel oxifluoride ceramics which could be used for the fabrication of multilayer capacitors. The aim of this work is the investigations of structural, thermal and dielectric properties in new oxifluoride phases $Ca_{1-x}Sr_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x}$.

Crystalline powders of $CaTiO_3$, $SrF_2$ and LiF with different molar compositions are mixed then dry-ground. The powder mixtures thus obtained are shaped to disks by cold-isostatic pressing and fired in air atmosphere at a temperature sufficient to develop useful properties. The XRD patterns show the formation of a solid solution $Ca_{1-x}Sr_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x}$ ($0 \leq x \leq 0.25$) in the system $CaTiO_3 - SrF_2 - LiF$. The symmetry of each sample is orthorhombic and the unit cell volume increases with increasing x. The SEM observations achieved on fractured ceramics show a grain average size of about 1 – 1.5μm. DSC and dielectric measurements are carried out between room temperature and 600°C. In general, each oxifluoride exhibits three phase transitions in the temperature range investigated whereas pure $CaTiO_3$ undergoes only two phase transitions at very high temperatures. These novel oxifluoride ceramics are characterized by a strong frequency dispersion of the dielectric response. This behavior is typical of relaxors.

---

***The Fifth Conference on Solid State Chemistry (SSC'2002), BRATISLAVA, Slovaquia, July 7-12, 2002.***