MULTIFUNCTIONAL CERAMICS $Ba_{1-x}Sr_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x}$

M. MEYAR and L. TAÏBI-BENZIADA

Faculty of Chemistry, USTHB, Algiers, Algeria

In recent years, ferroelectric materials attracted more and more researchers because they became very important for a lot of applications such as multilayer capacitors, sensors, resonators, filters, non-volatile Ferroelectric Random Access Memories (FRAMs). At the present time, the suitable ferroelectrics for these devices are $Pb(Zr,Ti)O_3$ (PZT), $SrBi_2Ta_2O_9$ (SBT), $Bi_4Ti_3O_{12}$ (BIT) and $(Ba,Sr)TiO_3$ (BST) systems. For example, the $Ba_{0.6}Sr_{0.4}TiO_3$ films offer many advantages for the development of high density FRAMs. This study is mainly devoted to investigations of the chemical system $BaTiO_3$ - SrF_2 - LiF.

First of all, mixtures of $(1-x)BaTiO_3 + xSrF_2 + xLiF$ are prepared and dry-ground. The powders thus obtained are then shaped to discs and treated in free-air at 950°C for 2 hours. The XRD patterns show the formation of a new solid solution with general formula $Ba_{1-x}Sr_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x}$ which occurs in the composition range $0 \leq x \leq 0.3$. The shrinkage coefficient varies between 14.5% and 16.8%. The ceramic grain size is observed by Scanning Electron Microscopy (SEM) on fractured samples. The phase transitions in these perovskite-type oxifluorids are investigated by dielectric measurements and Differential Scanning Calorimetry (DSC). These new phases are suitable for various microelectronic devices.

Ninth European Conference and Exhibition of the European Ceramic Society (EcerS IX), PORTOROZ, Slovenia, 19-23 June 2005.