NEW PHASES $Sr_{0.95}M_{0.05}(Ti_{0.95}Li_{0.05})O_{2.85}F_{0.15}$ (M = Ca , Sr or Pb) : SYNTHESIS, SINTERING AND CHARACTERIZATIONS

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Strontium titanate $SrTiO_3$ is the first example of the quantum paraelectric perovskite titanate. This material undergoes two phase transitions at very low temperature corresponding to the structural sequence orthorhombic ↔ tetragonal ↔ cubic which occur respectively at 65K and 110K. Since a decade, $SrTiO_3$ is intensively studied worldwide owing to its belonging to the category of smart materials with a high level of intelligence. This multifunctional perovskite is of particular interest for practical exploitation in the fabrication of sensors or high density memories. In earlier works we have synthesized three novel solid solutions $Sr_{1-x}M_x(Ti_{1-x}Li_x)O_{3-3x}F_{3x}$ (M = Ca, Sr or Pb). Here, the objective is the elaboration and characterization of electroceramics with the nominal composition $Sr_{0.95}M_{0.05}(Ti_{0.95}Li_{0.05})O_{2.85}F_{0.15}$. $SrTiO_3$ is previously synthesized at 1100°C. Pellets are prepared by cold-pressing the mixtures $0.95SrTiO_3+0.05MF_2+0.05LiF$ then sintered at 950°C for 2 hours. The ceramics thus obtained are investigated by several techniques: XRD, SEM, DSC and dielectric measurements as a function of temperature (25°C ≤ T ≤ 800°C) or frequency (100Hz ≤ f ≤ 40MHz). At room temperature, the oxifluorides crystallize in an orthorhombic complex perovskite isomorphous to $NaNbO_3$ whereas $SrTiO_3$ is cubic. For strontium titanate no phase transition is detected in the temperature range 25 – 800°C; on the other hand three phenomena associated to small change in heat capacity are observed for $Sr_{0.95}M_{0.05}(Ti_{0.95}Li_{0.05})O_{2.85}F_{0.15}$ samples. The $\varepsilon'_r = f(T)$ curves are consistent with the specifications of class I capacitors.

39th IUPAC Congress, Chemistry at the Interfaces, OTTAWA, Canada, 10-15 August 2003.