CRYSTALLOGRAPHIC AND DIELECTRIC PROPERTIES OF NEW FERROELECTRIC OXYFLUORIDES RELATED TO $KNbO_3$.

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The ferroelectric ABO_3 compounds with the perovskite structure are of great interest for applications. Derived $BaTiO_3$ compounds have stimulated many investigations. On the contrary, only few results are known on derived $KNbO_3$ materials; $KNbO_3$ undergoes three phase transitions, similar to those of $BaTiO_3$, but at higher temperatures:

$$\text{Rhombohedral} \xleftrightarrow[263K]{T_1} \text{Orthorhombic} \xleftrightarrow[498K]{T_2} \text{Tetragonal} \xleftrightarrow[708K]{T_C} \text{Cubic.}$$

The study of the $KNbO_3$ - $BaLiF_3$, $KNbO_3$ - $NaMgF_3$ and $KNbO_3$ - $KMgF_3$ systems has allowed us to determine the influence of various ionic substitutions on the crystallographic and dielectric properties of $KNbO_3$. All reactions were performed under dry helium atmosphere in order to prevent from any hydrolysis:

$$(1\text{-}x)\ KNbO_3 + x\ BaLiF_3 \xrightarrow[15h]{900°C} K_{1-x}Ba_x(Nb_{1-x}Li_x)O_{3-3x}F_{3x} \quad (0 \le x \le 0.075)$$

$$(1\text{-}x)\ KNbO_3 + x\ NaMgF_3 \xrightarrow[15h]{900°C} K_{1-x}Na_x(Nb_{1-x}Mg_x)O_{3-3x}F_{3x} \quad (0 \le x \le 0.30)$$

$$(1\text{-}x)\ KNbO_3 + x\ KMgF_3 \xrightarrow[15h]{900°C} K(Nb_{1-x}Mg_x)O_{3-3x}F_{3x} \quad (0 \le x \le 0.40)$$

X-ray diffraction investigations have shown each sample of the previously mentioned solid solutions to have an orthorhombic symmetry at room temperature. As the rate of substitution increases, the volume of the orthorhombic cell:

- increases with $BaLiF_3$ - decreases with $NaMgF_3$ and is almost constant when $KMgF_3$ is used.

The ferroelectric Curie temperature decreases in any case with x from T_C ($KNbO_3$) =708 K to the lowest value T_C = 430 K for $K_{0.70}Na_{0.30}(Nb_{0.70}Mg_{0.30})O_{2.10}F_{0.90}$. The composition dependences of the values of T_1 rhomb.-orth. and T_2 orth.-tetr. have been also determined.
These results are compared to those obtained with the same additives but from $BaTiO_3$.

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