

Crystal structure and dielectric properties of the $[(\text{CH}_3)_2\text{NH}_2]_3\text{Sb}_{2(1-x)}\text{Bi}_{2x}\text{Cl}_9$ (DMACAB) mixed crystals.

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Phase transitions in $[(\text{CH}_3)_2\text{NH}_2]_3\text{Sb}_{2(1-x)}\text{Bi}_{2x}\text{Cl}_9$ (DMACAB) mixed salts in the composition range $0 \leq x \leq 0.41$ have been investigated by the pyroelectric method and dielectric measurements over the frequency range from 75 kHz to 900 MHz. The phase situation is additionally confirmed by the differential scanning calorimetry (DSC) and dilatometric techniques. A transition from the paraelectric (PE) to the ferroelectric (FE) phase is observed for crystals with $0 \leq x \leq 0.14$. Pyroelectric measurements support the presence of polar phases. The dynamic dielectric behaviour of ferroelectric systems is found to be determined by the existence of two independent relaxators. The low-frequency relaxator reveals a critical slowing down of its dynamics in the close vicinity of the PE $\rightarrow$ FE transition. For compositions in the range $0.17 \leq x \leq 0.41$ a new sequence of phase transitions appears without any polar phases being present. The disappearance of ferroelectric properties is related to the fundamental changes in the crystal structure of the mixed compounds. The characteristic feature of the ferroelectric mixed crystals ($0.0 \leq x \leq 0.14$) is the presence of polyanionic $(\text{M}_2\text{Cl}_9^{3-})_n$ ($\text{M} = \text{Sb}, \text{Bi}$) layers, whereas non-ferroelectric ones are characterized by a different anionic sublattice composed of polyanionic one-dimensional double chains.

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