

Structure and phase transition in $(\text{CH}_3\text{NH}_3)_3\text{Bi}_2\text{Br}_9$. A novel improper ferroelectrics

Autorzy

Ryszard Jakubas

Urszula Krzewska

Grażyna Bator

Lucjan Sobczyk

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The crystals of $(\text{CH}_3\text{NH}_3)_3\text{Bi}_2\text{Br}_9$ have been grown which at room temperature are isomorphous with $\text{Cs}_3\text{Bi}_2\text{Br}_9$ and $(\text{CH}_3\text{NH}_3)_3\text{Sb}_2\text{Br}_9$. The space group is $P3m1$, $a = 0.807$, $c = 1.008$ nm, $V = 0.5685$ nm³, $Z = 1$. The crystals reveal, when cooling, three phase transitions at 188 ± 0.5 , 140 ± 1 , and 101.5 ± 0.5 K. The high temperature phase (I) behaves as a plastic one with respect to a freedom of rotation of methylammonium cations. The two high temperature transitions I II and II III can be related, similarly to $(\text{CH}_3\text{NH}_3)_3\text{Sb}_2\text{Br}_9$, to a freezing of reorientation of those cations. At 101.5 K a transition to the improper ferroelectric phase IV was discovered. The features of this phase are non-typical and the nature of the transition is unknown.

Adres publiczny

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