



The motley family of polar compounds (MV) $M(X_5-xX)_x$ based on anionic chains of trans-connected $M-(III)(X)_6$ octahedra ($M=Bi, Sb$; $X, X=Cl, Br, I$) and methylviologen (MV) dications

Submitted by Emmanuel Lemoine on Thu, 02/06/2014 - 11:11

Titre The motley family of polar compounds (MV) $M(X_5-xX)_x$ based on anionic chains of trans-connected $M-(III)(X)_6$ octahedra ($M=Bi, Sb$; $X, X=Cl, Br, I$) and methylviologen (MV) dications

Type de publication Article de revue

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Type Article scientifique dans une revue à comité de lecture

Année 2012

Langue Anglais

Date 11/2012

Pagination 140-148

Volume 195

Titre de la revue Journal of Solid State Chemistry

ISSN 0022-4596

Résumé en anglais The search for hybrid organic-inorganic materials remains a great challenge in the field of ferroelectrics. Following the discovery of the room temperature ferroelectric material (MV)[BiI₃Cl₂] (MV²⁺: methyl-viologen) exhibiting the highest polarization value in the field of hybrid ferroelectrics, we report here nine new hybrids with the general formulation (MV)[(MX_{5-x}X)_x-(III)(x)] ($M=Bi, Sb$; $X, X=Cl, Br, I$): (MV)[BiCl_{3.3}Br_{1.7}] (1), (MV)[BiCl_{1.3}Br_{3.7}] (2), (MV)[BiBr_{3.2}I_{1.8}] (3), (MV)[SbCl₅] (4), (MV)[SbBr₅] (5), (MV)[SbCl_{3.8}Br_{1.2}] (6), (MV)[SbCl_{2.4}Br_{2.6}] (7), (MV)[SbI₃Cl₂] (8) and (MV)[SbBr_{3.8}I_{1.2}] (9). Depending on the presence of polar chains or not, and on the coupling of polar chains, two types of centrosymmetrical structures [C1] and [C2] and two types of polar structures [P1] and [P2] are defined. (2) undergoes a paraelectric-to-relaxor ferroelectric transition around 100-150 K depending of the frequency showing that the Curie temperature, T_C , of (MV)[BiBr₅] (243 K) can be modulated by the substitution of Br by Cl. The most interesting family is the [P2] type because the syn coupling of polar chains is in favor of high polarization values, as in (MV)[BiI₃Cl₂]. Five of the nine new hybrids, (4), (6-9), which have the [P2] type structure are potential ferroelectrics. (C) 2012 Elsevier Inc. All rights reserved.

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DOI 10.1016/j.jssc.2012.03.020 [8]

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