

Thermal, dielectric and vibrational properties of ferroelastic $[(\text{CH}_3)_3\text{PH}]_3[\text{Sb}_2\text{Cl}_9]$ crystal. Molecular motion of trimethylphosphonium cations studied by proton magnetic resonance.

Autorzy

Maciej Wojtaś

Wojciech Medycki

Jan Baran

Ryszard Jakubas

Rok wydania

2010

Czasopismo

Chemical Physics

Numer woluminu

371

Strony

66-75

DOI

10.1016/j.chemphys.2010.04.005

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

$[(\text{CH}_3)_3\text{PH}]_3[\text{Sb}_2\text{Cl}_9]$ (abbreviated as TMPCA) was found to undergo numerous reversible structural phase transitions studied by dilatometric and dielectric methods: I $\leftrightarrow$ II at 375/372 (heating/cooling), II $\leftrightarrow$ III at 272/272, III $\leftrightarrow$ IV at 223/216 and IV $\leftrightarrow$ V at 212/206 K. Debay-like dispersion of the electric permittivity in the kilohertz frequency region over the phases I and II is disclosed. The molecular parameters of the relaxation process assigned to the motion of the trimethylpyridinium cations are evaluated. The pyroelectric measurements of TMPCA confirmed the polar/pyroelectric nature of the lowest temperature phase (V). Proton spin-lattice relaxation time of polycrystalline TMPCA was studied in the temperature range 80–429 K. A dynamic inequivalence of two trimethylphosphonium cations performing complex reorientational motion (C_3 —of methyl groups, —of the cation around the P—H bond and the isotropic motion of the whole cation) was detected. A ferroelastic domain structure was observed in all phases below 375 K. The infrared and Raman spectra for TMPCA were measured in the region of the internal vibrations of the trimethylphosphonium cations and $[\text{Sb}_2\text{Cl}_9]^{3-}$ anions in the wide temperature region (Raman 12–404 K, IR 300–413 K). The possible mechanisms of the phase transitions are discussed on the basis of the presented results.

Słowa kluczoweChloroantimonate(III), phase transition, dielectric relaxation, Ferroelastic, ^1H NMR, Raman, IRAdres publiczny<https://doi.org/10.1016/j.chemphys.2010.04.005>Strona internetowa wydawcy<http://www.elsevier.com>

Plik został wygenerowany dnia 2026-08-23 10:02:25

Adres w repozytorium <https://old.chem.uni.wroc.pl/pl/repozytorium/XTf07Xn>.