



Dielectric-optical switches: photoluminescent, EPR, and magnetic studies on organic–inorganic hybrid (azetidinium)₂MnBr₄

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Streszczenie

A new organic–inorganic hybrid, **AZEMnBr**, has been synthesized and characterized. The thermal differential scanning calorimetry, differential thermal analysis, and thermogravimetric analyses indicate one structural phase transition (PT) at 346 and 349 K, on cooling and heating, respectively. **AZEMnBr** crystallizes at 365 K in the orthorhombic, *Pnma*, structure, which transforms to monoclinic *P2₁/n* at 200 K. Due to the X-ray diffraction studies, the anionic MnBr₄^{2–} moiety is discrete. The azetidinium cations show dynamical disorder in the high-temperature phase. In the proposed structural PT, the mechanism is classified as an order–disorder type. The structural changes affect the dielectric response. In this paper, the multiple switches between low- and high- dielectric states are presented. In addition, it was also observed that the crystal possesses a mutation of fluorescent properties between phase ON and OFF in the PT's point vicinity. We also demonstrate that EPR spectroscopy effectively detects PTs in structurally diverse Mn(II) complexes. **AZEMnBr** compounds show DC magnetic data consistent with the *S* = 5/2 spin system with small zero-field splitting, which was confirmed by EPR measurements and slow magnetic relaxation under the moderate DC magnetic field typical for a single-ion magnet behavior. Given the above, this organic–inorganic hybrid can be considered a rare example of multifunctional materials that exhibit dielectric, optical, and magnetic activity.

Słowa kluczowe

Crystals, Phase transitions, Crystal structure, Insulators, Cations

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