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Structural study, spectroscopic analysis and dielectric proprieties of new hybrid organic-inorganic compound

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Abstract

The present research work presented the growth, the crystal structure and the spectroscopic study of a new organic inorganic hybrid compound $[C_{12}H_{12}N]_2ZnCl_4$. In fact, the single crystals of bis (4-benzylpyridinium) tetrachlorozincate (II), $[4-BP]_2ZnCl_4$ were obtained by slow evaporation of an aqueous solution at room temperature and crystallized in the centrosymmetric space group $-P2_1n$ of Monoclinic system. The infrared (FT-IR), Raman and RMN spectra of the title compound were recorded at room temperature and then analyzed. The thermal study and the evolution of the complex permittivity of the single crystal sample have been reported to explain the availability of the phase transition at 368 K.

Keywords: 4-BP, X-ray crystal structure, zinc (II) compound, thermal analysis, dielectric study.

1. Introduction

Hybrid organic-inorganic materials are receiving considerable interest as they give the chance to mix and to benefit from the better of the two fields: organic and inorganic. Thus, these materials with novel properties have aroused great attention of solid-state chemists [1, 2], which are studied to explore their magnetic [3], electrical [4-6] and optical properties [7]. Moreover, inorganic divalent zinc chloride possesses several applications in various domains of catalysis, biochemistry, dielectric transition and magnetism material science [8-10]. 4-BP molecules, on the other hand, can provide a novel structural topologies and properties, such as luminescence and semiconductivity [11, 12]. Besides, the organization in the crystal packing needs efficacious forces with the non-covalent interactions, which played an essential role.

In this context, we are going to reported in the present paper the structural geometry and the spectroscopic study of bis(4-benzylpyridinium) tetrachlorzincate (II) crystals is investigated, the Hirshfeld surface analysis is introduced in order to evaluate the interactions within the crystal structure, The thermal analysis and dielectric measurement are also performed.

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