

Optical and Dielectric Properties of Self-Assembled 0D Hybrid Organic-Inorganic Insulator

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Abstract : The organic–inorganic hybrid perovskite-like $[\text{C}_6\text{H}_5\text{C}_2\text{H}_4\text{NH}_3]_2\text{ZnCl}_4$ (PEA-ZnCl₄) was synthesized by saturated solutions method. X-ray powder diffraction, Raman spectroscopy, UV-visible transmittance, and capacitance meter measurements have been used to characterize the structure, the functional groups, the optical parameters, and the dielectric constants of the material. The material has a layered structure. The optical transmittance (T %) was recorded and applied to deduce the absorption coefficient (α) and optical band gap (E_g). The hybrid shows an insulator character with a direct band gap about 4.46 eV, and presents high dielectric constants up to a frequency of about 10^5 Hz, which suggests a ferroelectric behavior. The reported optical and dielectric properties can help to understand the fundamental properties of perovskite materials and also to be used for optimizing or designing new devices.

Keywords : dielectric constants, optical band gap (eg), optical parameters, Raman spectroscopy, self-assembly organic inorganic hybrid

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