

Pressure-induced reversible framework rearrangement and increased polarization in the polar $[\text{NH}_4][\text{Cd}(\text{HCOO})_3]$ hybrid perovskite

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In this work, we study the structural changes of the polar $[\text{NH}_4][\text{Cd}(\text{HCOO})_3]$ hybrid perovskite under external hydrostatic pressure. We report a reversible framework rearrangement as a function of pressure characterized by: (i) a gradual modification of one formate ligand, which changes its coordination mode from a bridging syn-anti mode at atmospheric pressure (LP-phase) to a chelating-anti mode at high-pressure (HP-phase) and (ii) a change in the coordination of the Cd^{2+} cations from six-coordinated (LP-phase) to hepta-coordinated (HP-phase). Very interestingly, this unprecedented framework arrangement displays a large electrical polarization. For instance, the polarization value observed at $p = 17.7$ GPa is about four times the polarization at atmospheric pressure. Therefore, we report that the external pressure induces a novel framework rearrangement in the polar $[\text{NH}_4][\text{Cd}(\text{HCOO})_3]$ hybrid perovskite with enhanced electrical polarization. This structure-property relationship offers new insights for designing novel ferroelectric materials based on pressure-responsive hybrid perovskite materials

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