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Experimental Demonstration of Hybrid Improper Ferroelectric in the Layered Ruddlesden-Popper Compounds

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Geometric ferroelectrics are called as improper ferroelectrics where geometric structural constraints, rather than typical cation-anion pairing, induce proper ferroelectric polarization. Hybrid improper ferroelectricity, one kind of geometric ferroelectricity, results from the combination of two or more of non-ferroelectric structural order parameters. In recent, hybrid improper ferroelectricity has been theoretically predicted in ordered perovskites and the Ruddlesden-Popper compounds. However, the ferroelectricity of these compounds has never been experimentally confirmed and even their polar nature has been under debate. In this talk, we report our experimental results of exploring switchable electric polarization and domain structures in the single crystals of the $n = 2$ layered Ruddlesden-Popper compounds.

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