Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Material

Electrical control of topological spin textures in two-dimensional multiferroics

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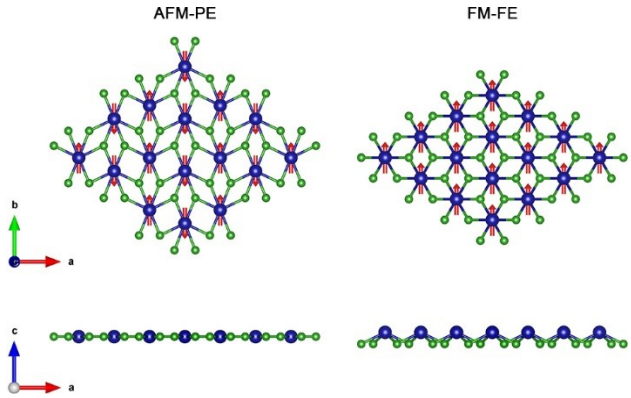

Fig. S1. The schematic structures of paraelectric (PE) phase CrB_2 (left panel) and ferroelectric (FE) phase CrB_2 (right panel). For PE CrB_2, it adopts the antiferromagnetic (AFM) ground state. And for FE CrB_2, it adopts the ferromagnetic (FM) ground state.

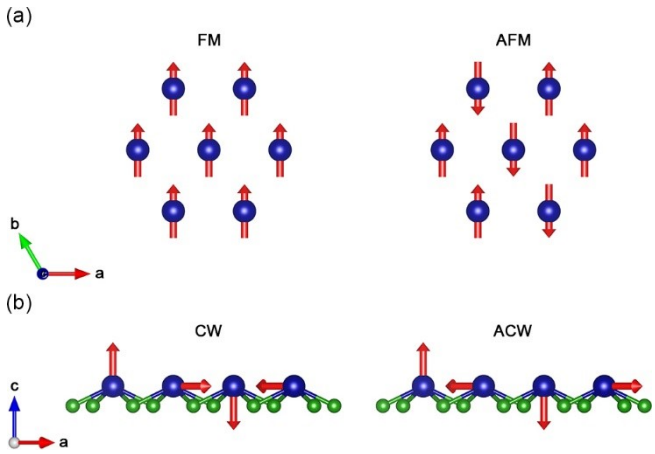

Fig. S2. Spin configurations for the calculations of (a) Heisenberg exchange coupling parameter J and (b) Dzyaloshinskii–Moriya interaction parameter d, showing the ferromagnetic (FM)/antiferromagnetic (AFM) collinear configurations and clockwise (CW)/anticlockwise (ACW) chiral configurations, respectively.

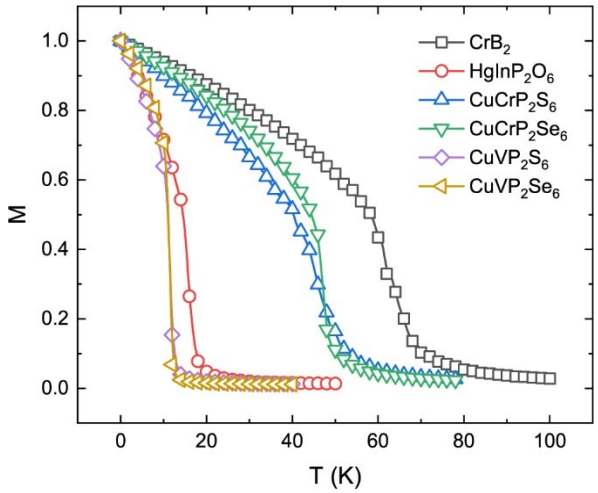

Fig. S3. Calculated normalized magnetization versus temperature for CrB_2, $HgInP_2O_6$, $CuCrP_2S_6$, $CuCrP_2Se_6$, $CuVP_2S_6$, and $CuVP_2Se_6$ monolayers.

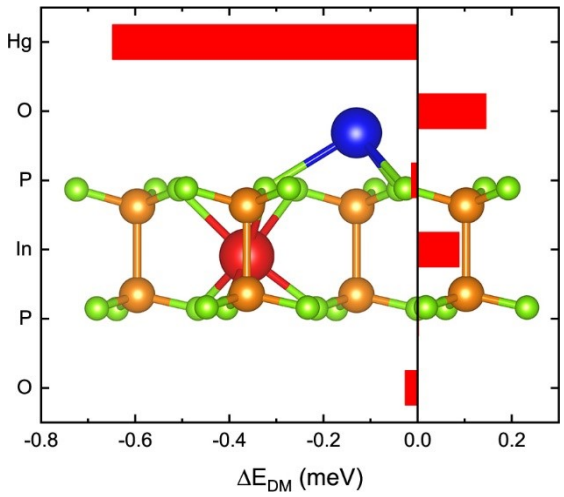

Fig. S4. Atomic-layer-resolved localization of DMI energies ΔE_{DM} for $HgInP_2O_6$ monolayer.

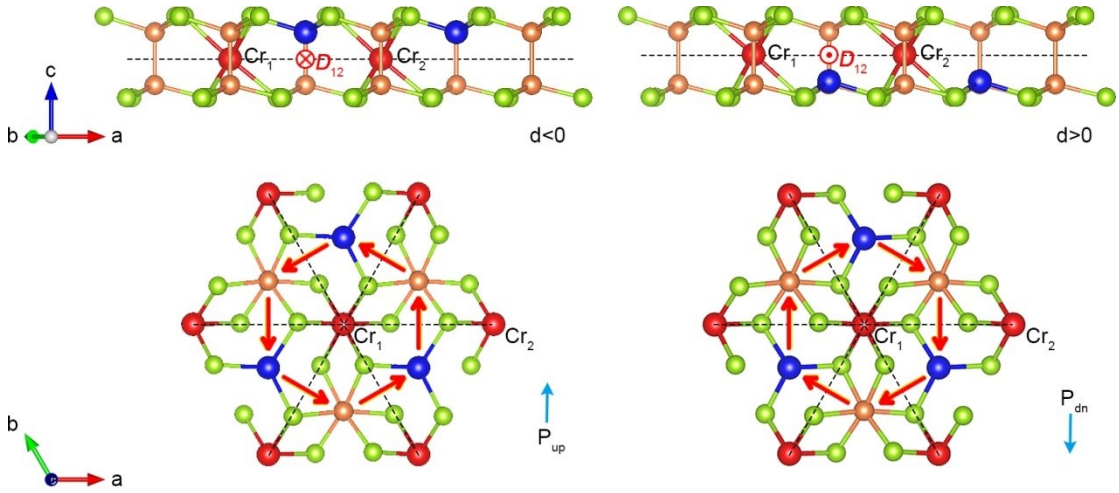

Fig. S5. The DMI vectors $\boldsymbol{D}_{12}$ (red vectors) between the nearest neighbors of Cr atoms (red balls) in $CuCrP_2Se_6$ with opposite polarizations, where the displacement of Cu atoms (blue balls) along the plane normal causes out-of-plane polarization.