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Nonreciprocal charge transport in polar Dirac metals with tunable spin-valley coupling

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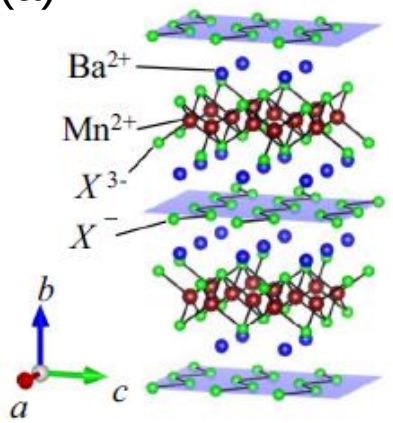
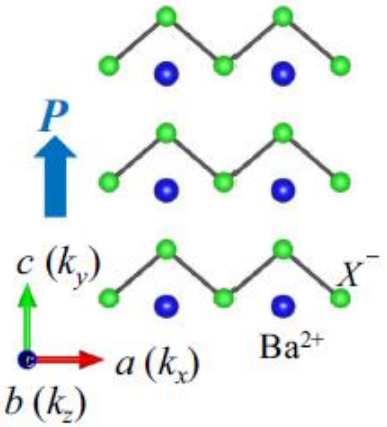
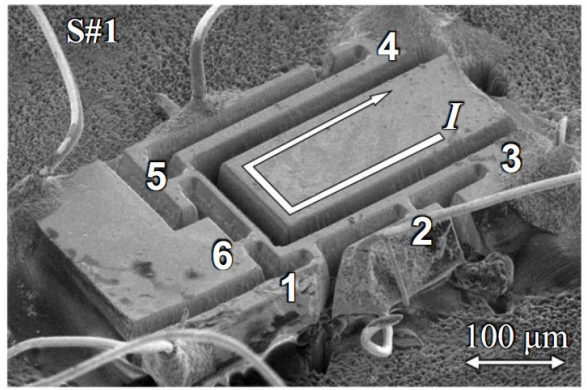
(a)



(b)



(c)



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In metals with broken inversion symmetry, the nonreciprocal transport, which is a current-dependent resistance like diode, can be observed with particular field and current direction.
The nonreciprocal component is usually negligible because it is much smaller than the magnetoresistance.

In this study, we succeeded to observe the significant nonreciprocal transport in microdevice of layered Dirac metals $BaMnX_2$ (X=Sb, Bi) fabricated by focused ion beam.

Based on comparison with the first-principles calculation, it is revealed that the nonreciprocal transport should highly depend on the configuration of spin-polarized Dirac valleys.