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(POS-68) In-situ ultrafast charge carrier dynamics of the two-dimensional perovskites

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Despite more than 25% power conversion efficiency (PCE) of organic-inorganic metal halide perovskite (HOIP), it remains a significant challenge to improve the long-term environmental stability, which hinders their further commercial application. Two-dimensional (2D) perovskite, originating from 3D perovskite structures, can be tuned by atomic scales, leading to electronic band structure tunability beyond 3D perovskites. In addition, they show much higher environmental stability as compared to their 3D counterpart. However, the carrier photogeneration and transport mechanisms remain unclear.
In contrast to that research community mainly relied on the traditional time-resolved optical spectroscopic techniques including pump–probe and fluorescence approaches to investigate carrier diffusion dynamics, we have used the novel ultrafast photocurrent spectroscopy to investigate the carrier drift dynamics. In this project, we have investigated the 2D perovskites system including type 1 and type 2 perovskite (e.g., (4Tm)2PbI4, (BTm)2PbI4, BA2PbI4) and elucidated the nature of fundamental carrier photogeneration mechanism. Our work establishes the foundation for the 2D perovskite application in photovoltaics, photodetection, and LEDs.

Keyword-1

low dimensional

Keyword-2

drift dynamics

Keyword-3

exciton diffusion

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