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**Understanding the Unique Properties of Organometal Trihalide Perovskite with Single Crystals<sup>1</sup>**

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Organometal Trihalide Perovskite has been discovered to be all-round optoelectronic materials many types of electronic devices. The understanding of this family of materials is however limited yet due to the complicated grain structures in polycrystalline films which are generally used in most of the devices. In this contribution, I will present our recent progress in understanding the fundamental properties, including optoelectronic properties and electromechanical properties, using the high quality organometal trihalide perovskite single crystals. I will report the crystallographic orientation dependent charge transport and collection, surface and bulk charge recombination process, and direction measuring of carrier diffusion length using the lasing induced photocurrent scanning. The polarity of the organometal trihalide perovskite crystals will also be examined.

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