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Spatially resolved optoelectronic characterization of perovskite lead iodide nanostructures RUI XIAO, XINGYU PENG, YASEN HOU, DONG YU, Univ of California - Davis — The high power conversion efficiency of organo-lead halide perovskite-based solar cells has attracted world-wide attention over the past few years. The high efficiency was believed to originate from the unusual properties including long carrier lifetimes and consequent long carrier diffusion lengths in these materials. Ion drift, ferroelectricity, and charge traps have been proposed to account for the efficient charge separation and photocurrent hysteresis. However, it remains unclear which mechanism is dominating. We fabricate field effect transistors (FETs) incorporating single nanoplates/nanowires of organic perovskite and perform scanning photocurrent microscopic (SPCM) measurements to extract carrier diffusion lengths as a function of gate voltage, source-drain bias. Spatially resolved optoelectronic investigations of single crystalline perovskite nanostructures provide valuable information and key evidence on distinguishing the dominating charge transport/separation mechanism.

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