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Magnetic Field Effects in Hybrid Perovskite Devices C. ZHANG, D. SUN, C.-X. SHENG, Y. ZHAI, University of Utah, K. MIELCZAREK, A. ZAKHIDOV, University of Texas at Dallas, Z.V. VARDENY, University of Utah —
Solar cells based on the organic-inorganic perovskites ($CH_3NH_3PbX_3$, X=halogen) have reached a remarkable power conversion efficiency approaching 20%, which calls for research studies of the photophysics behind this high device performance. We measured significant magneto-photocurrent (MPC) response in $CH_3NH_3PbI_{3-x}Cl_x$ photovoltaic cells, in the form of Lorentzian up to field B =1T. We attribute the MPC(B) response to spin mixing of loosely-bound photogenerated e-h pairs having different g-factor (dubbed "Δg mechanism"). We verified this mechanism by measuring Δg directly, using the field induced circularly polarized photoluminescence emission at low temperature, along with the photocarriers' lifetime measured by picosecond pump-probe spectroscopy. We conclude that MPC of spin 1/2 e-h pairs provides a promising method for investigating the spin-related properties of photoexcitations in the novel hybrid perovskites.

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