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Magnetoelectric Photocurrent Generated by Direct Interband Transitions in InGaAs/InAlAs Two-Dimensional Electron Gas JUNFENG DAI, HAI-ZHOU LU, The University of Hong Kong, CHUNLEI YANG, Sun Yat-Sen University, SHUN-QING SHEN, FU-CHUN ZHANG, XIAODONG CUI, The University of Hong Kong, NANOSTRUCTURE CHARACTERIZATION GROUP TEAM, CENTRE OF THEORETICAL AND COMPUTATIONAL PHYSICS COLLABORATION, DEPARTMENT OF PHYSICS IN SUN YAT-SEN UNIVERITY COLLABORATION — We report the observation of magnetoelectric photocurrent generated via direct interband transitions in an InGaAs/InAlAs two-dimensional electron gas by a linearly polarized incident light. The electric current is proportional to the in-plane magnetic field, which unbalances the velocities of the photoexcited carriers with opposite spins and consequently generates the electric current from a hidden spin photocurrent. The spin photocurrent can be evaluated from the measured electric current, and the conversion coefficient of spin photocurrent to electric current is self-consistently estimated to be 10^{-3}–10^{-2} per Tesla. The observed light-polarization dependence of the electric current is well explained by a theoretical model which reveals the wave vector angle dependence of the photoexcited carrier density.

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