RESEARCH ARTICLE

High-performance type-II BiOI/CdS heterojunction photodetector for ultraviolet imaging and optical communication

Haoyue Wei[1], Qiuhong Tan[1,2,†], Ran Ma[1], Peizhi Yang[3], Yingkai Liu[1,2], Qianjin Wang[1,2,‡]

[1]College of Physics and Electronic Information, Yunnan Normal University, Kunming 650500, China

[2]Yunnan Provincial Key Laboratory for Photoelectric Information Technology, Yunnan Normal University, Kunming 650500, China

[3]Key Laboratory of Advanced Technique & Preparation for Renewable Energy Materials, Ministry of Education, Yunnan Normal University, Kunming 650500, China

Corresponding authors. E-mail: †tanqiuhong1@126.com, ‡qjwang@xtu.edu.cn

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Supporting Information

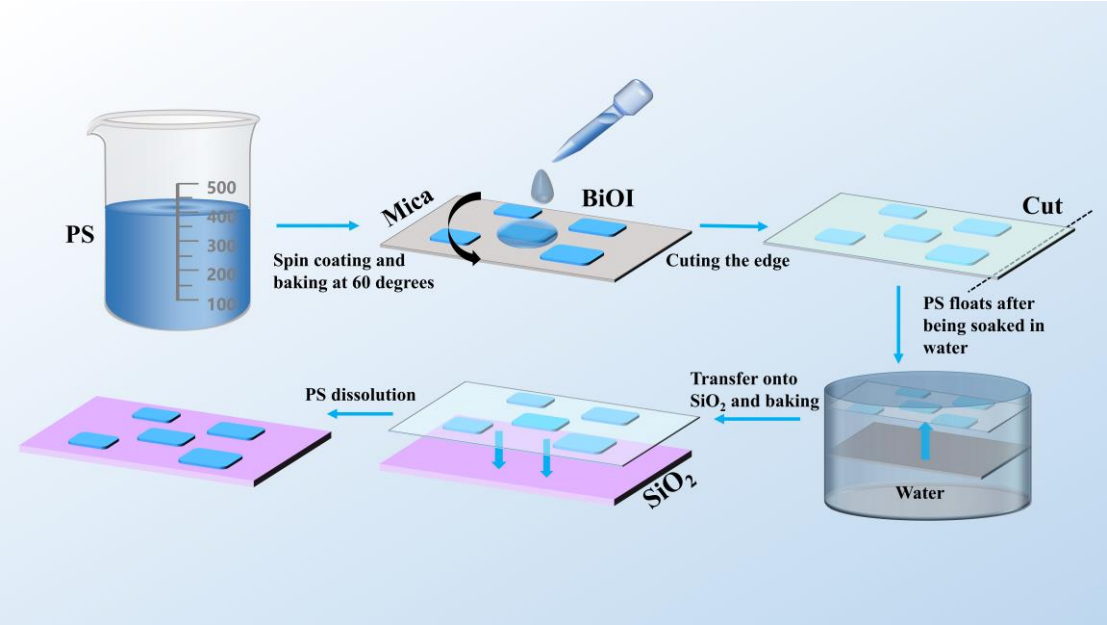

Fig S1. Schematic diagram of transferring BiOI nanosheets using a PS film.

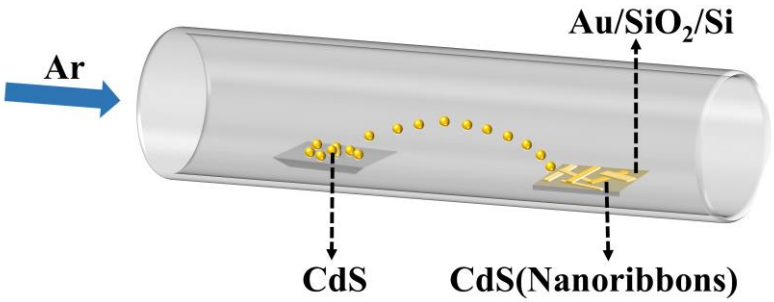

Fig S2. Schematic diagram of the growth process of CdS nanobelts.

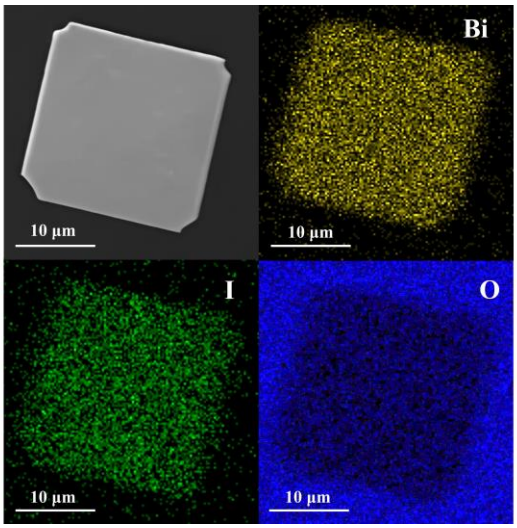

Fig S3. Scanning electron microscopy and EDS elemental composition of a single BiOI nanosheet.

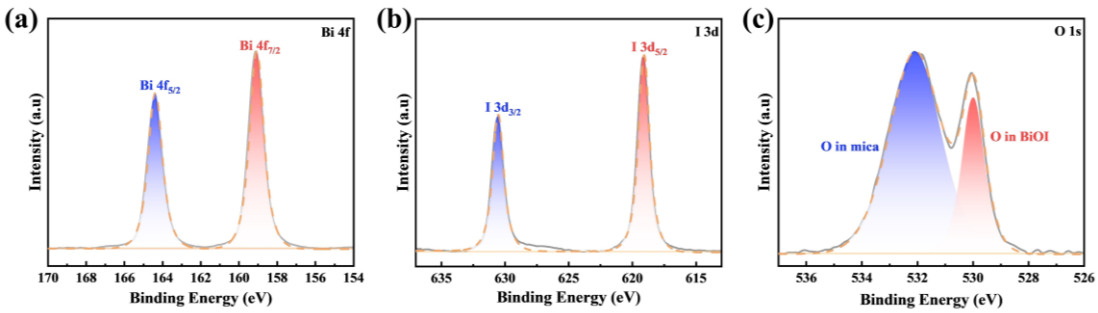

Fig S4. XPS spectra of BiOI nanosheets grown on mica. **(a)** Bi 4f, **(b)** I 3d, and **(c)** O 1s.

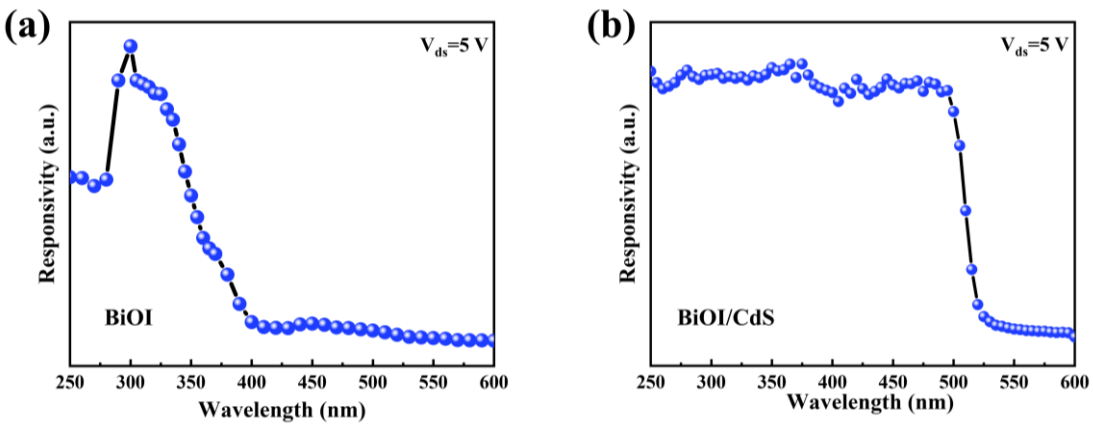

Fig S5. Spectral responsivity of **(a)** the 2D BiOI photodetector and **(b)** the BiOI/CdS heterojunction photodetector.

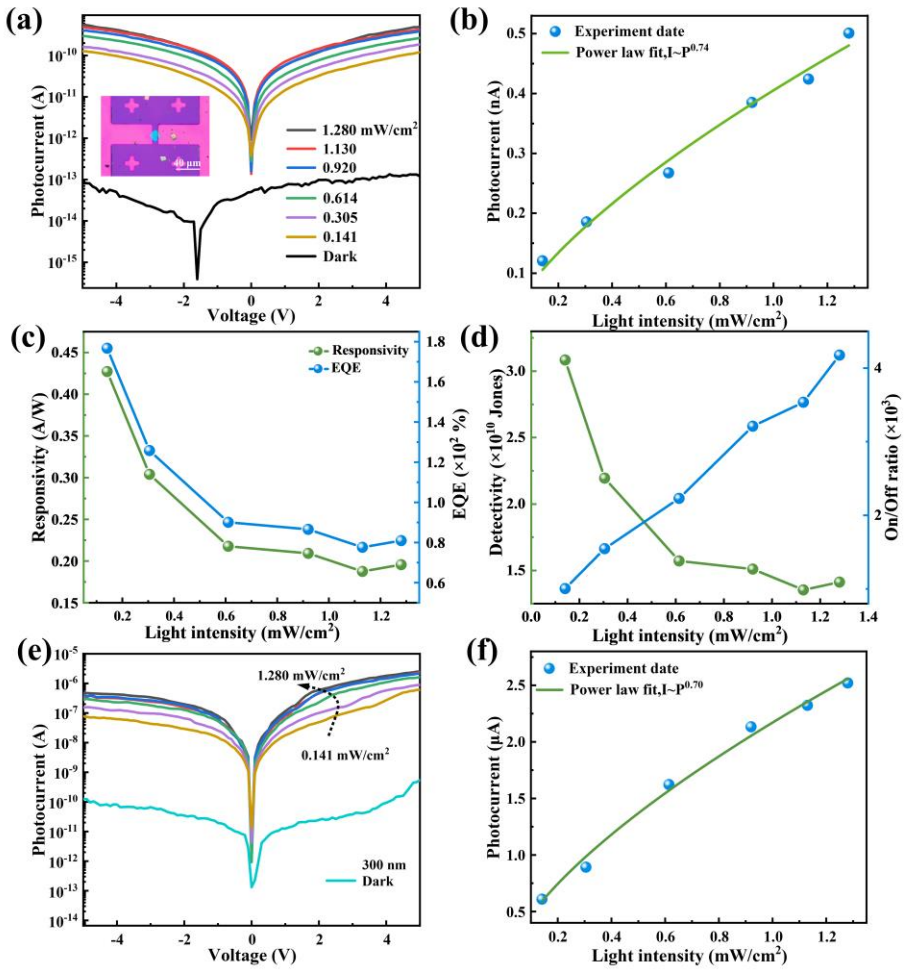

Fig S6. **(a)** Logarithmic *I–V* characteristics of the 2D BiOI photodetector in the dark and under 300 nm illumination at different optical power densities. **(b)** Fitting curve between optical power density and photocurrent at V_{ds} = 5 V. **(c)** Corresponding *R* and *EQE*, **(d)** D^* and on/off ratio under different optical power densities. **(e)** Logarithmic *I–V* curves of the CdS nanobelt photodetector under the same conditions. **(f)** Corresponding power-law fitting results.

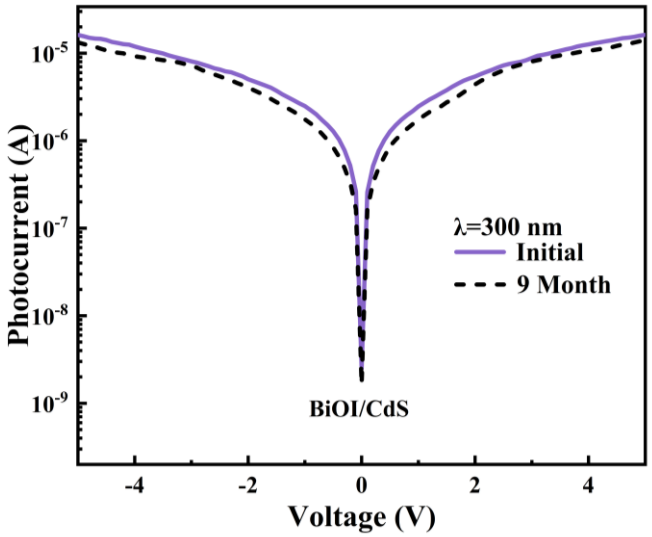

Fig S7. Photocurrent of BiOI/CdS device after 9 months of air exposure, measured under 300 nm illumination.

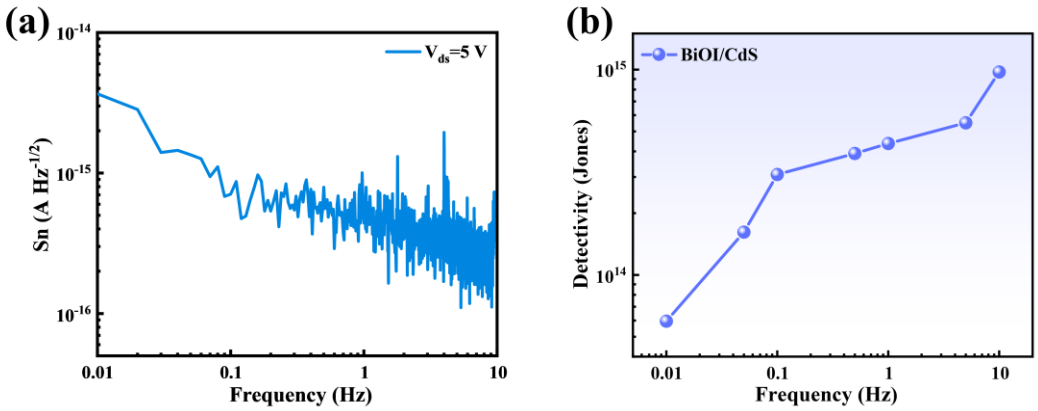

Fig S8. (a) Noise spectral density and **(b)** frequency-dependent D^* of the BiOI/CdS photodetector.

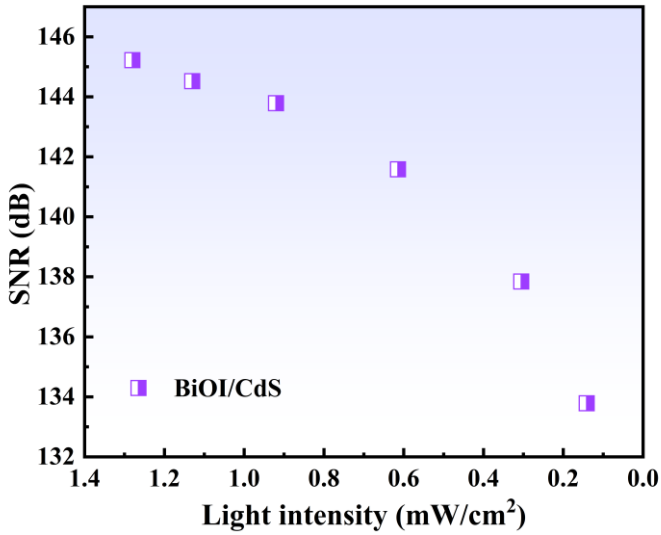

Fig S9. *SNR* measured at various optical power densities.

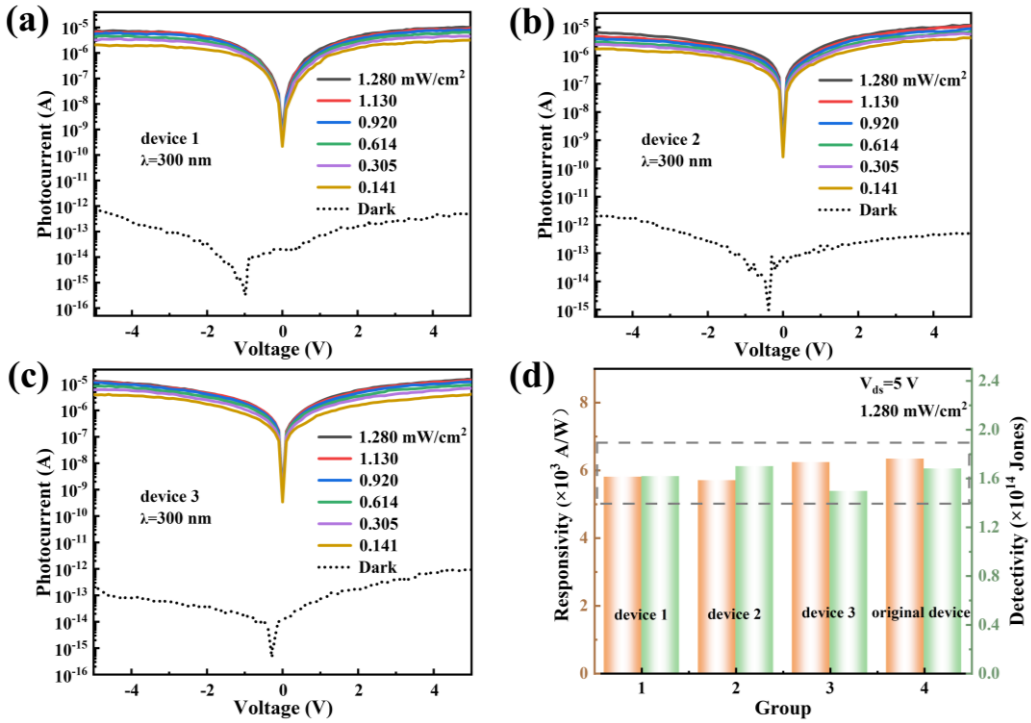

Fig S10. (a-c) The *I–V* curves of three distinct devices under 300 nm illumination at different optical power densities are presented. **(d)** The *R* and D^* of the three devices under 300 nm illumination at a power density of 1.280 mW/cm^2. The original device corresponds to the device reported in the main text.

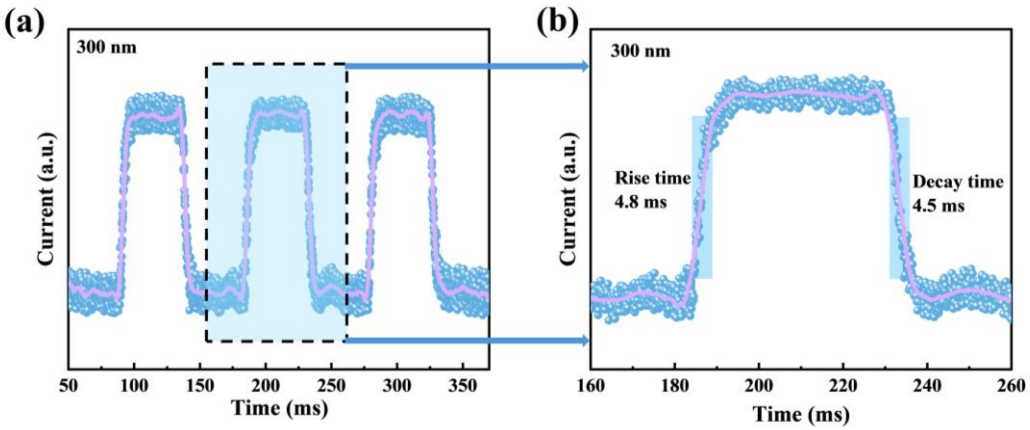

Fig S11. Rise and fall time of the 2D BiOI photodetector.

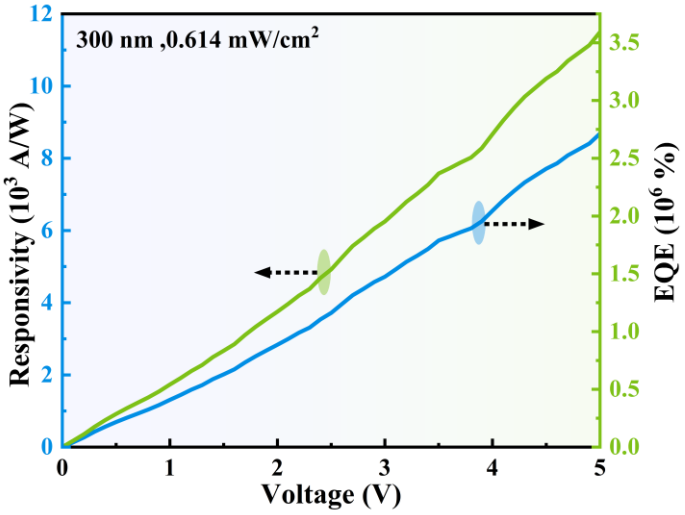

Fig S12. Dependence of *R* and *EQE* on the applied bias voltage at an incident power density of 0.614 mW/cm^2 under 300 nm UV illumination.