Supporting information for:

Charge Transfer Doping Enabled High-Performance Deep-Ultraviolet Photodetectors Based on CuI/β-Ga_2O_3 Heterostructures for Deep-Ultraviolet Optical Communication

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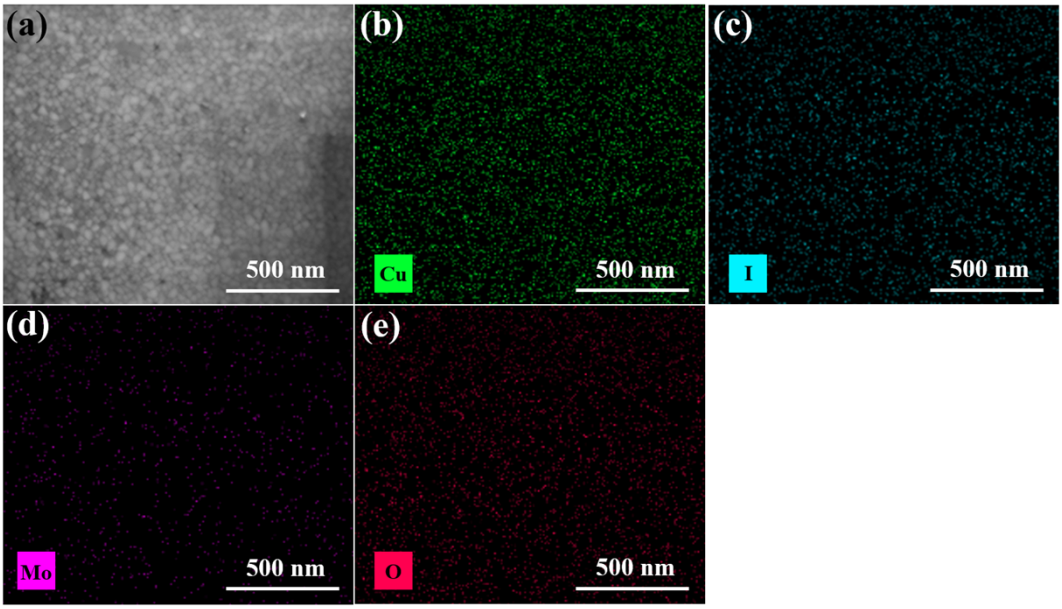

Fig. S1 (a) SEM image and corresponding (b) Cu, (C) I, (d) Mo, and (e) O elemental mapping of a 20 nm-thick CuI thin film doped with 3 nm-thick MoO_3 thin layer.

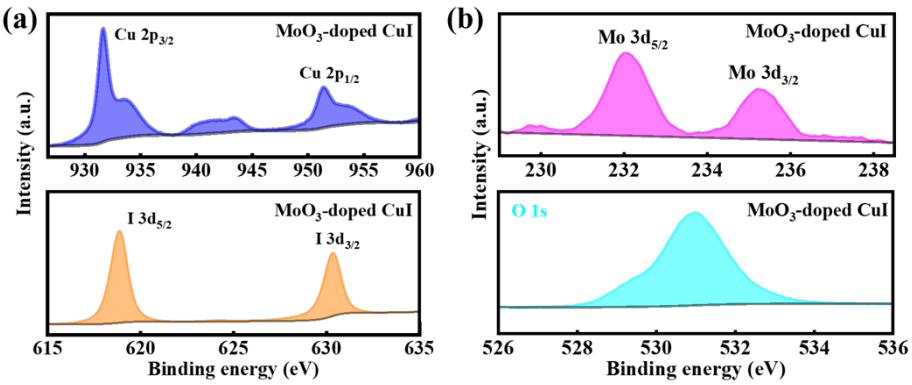

Fig. S2 XPS spectra of a MoO_3-doped CuI thin film, showing (a) Cu 2p and I 3d peaks and (b) Mo 3d and O 1s peaks.

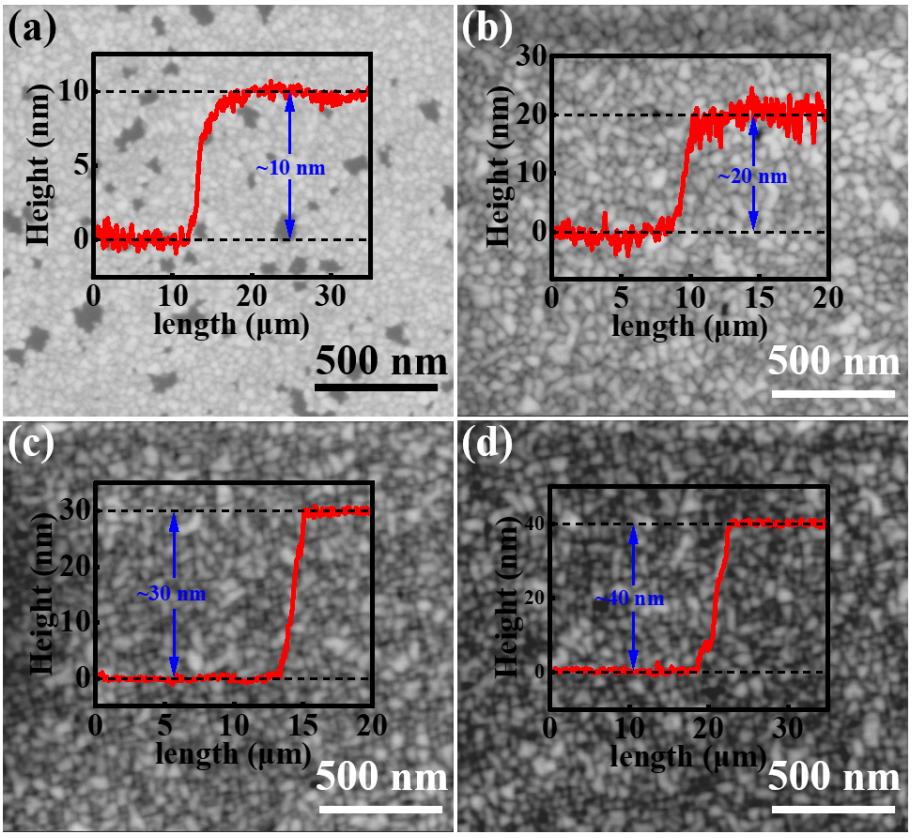

Fig. S3 SEM images of CuI thin films with different thicknesses of (a) 10 nm, (b) 20 nm, (c) 30 nm, and (d) 40 nm. The insets display the corresponding height profiles of the thin films.

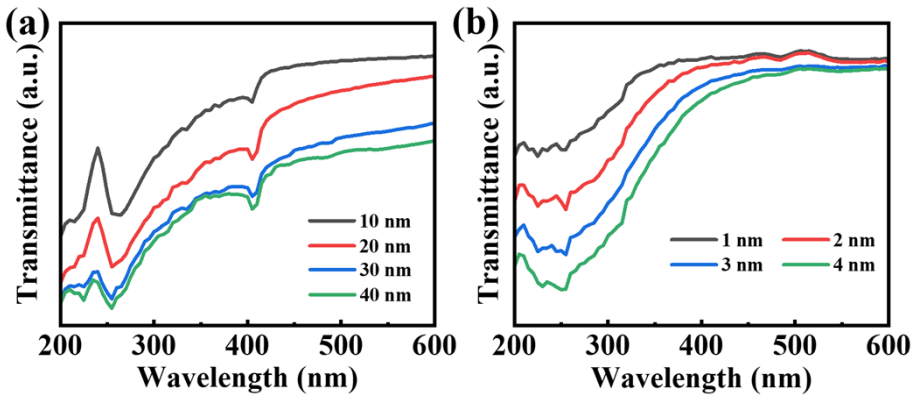

Fig. S4 Optical transmittance spectra of (a) CuI thin films with different thicknesses of 10 nm, 20 nm, 30 nm and 40 nm, and (b) MoO_3 thin layers with diverse thicknesses of 1 nm, 2 nm, 3 nm, and 4 nm.

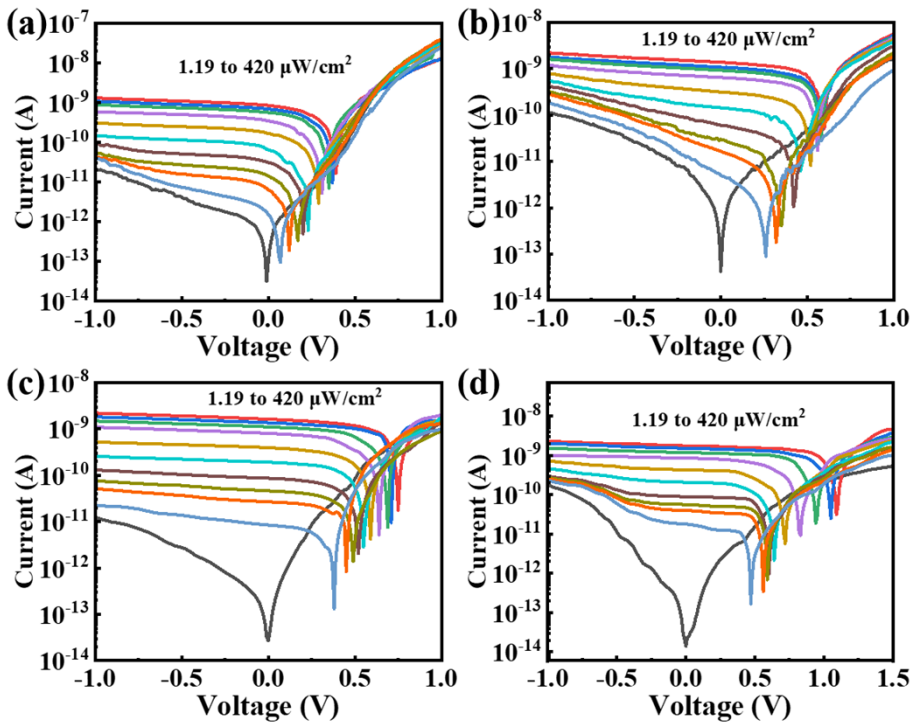

Fig. S5 *I-V* curves of the 20 nm-thick CuI/β-Ga_2O_3 heterostructure-based DUV light detectors doped with MoO_3 with different MoO_3 thicknesses of (a) 0 nm, (b) 1 nm, (c) 2 nm, and (d) 4 nm, upon 254 nm DUV light irradiations with different light intensities.

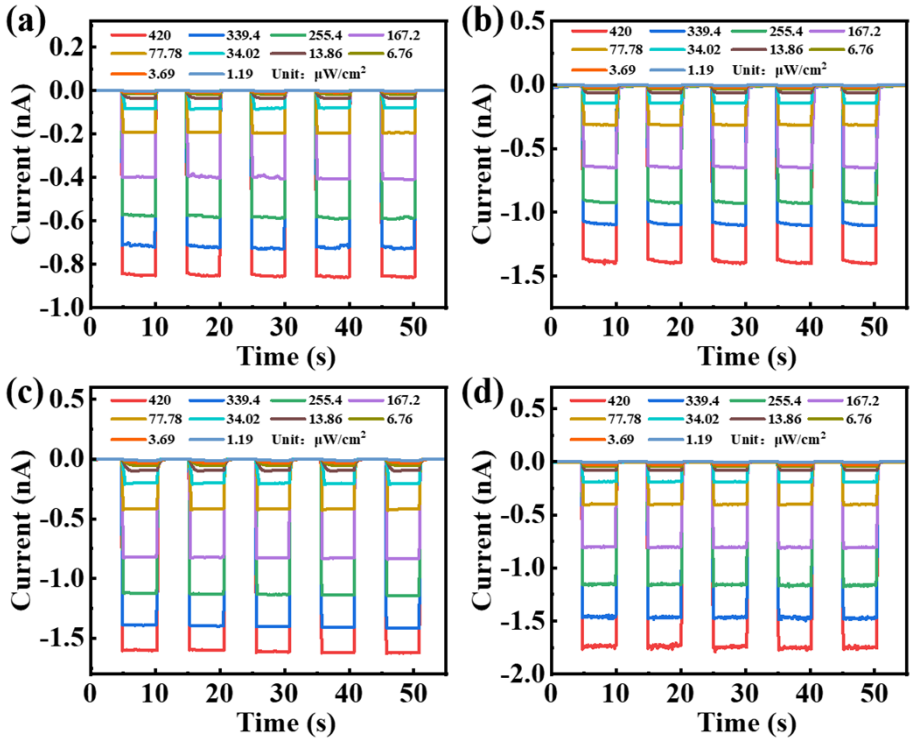

Fig. S6 Time-dependent photoresponse of the 20 nm-thick CuI/β-Ga_2O_3 heterostructure-based DUV light detectors doped with MoO_3 with different MoO_3 thicknesses of (a) 0 nm, (b) 1 nm, (c) 2 nm, and (d) 4 nm, upon 254 nm DUV light irradiations with different light intensities.

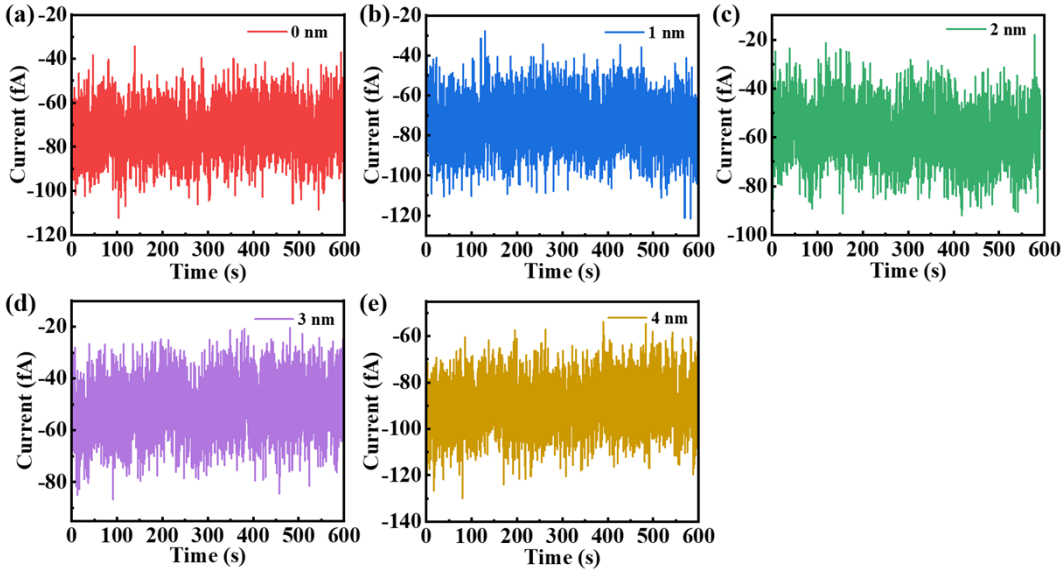

Fig. S7 The curve of dark current at zero bias *versus* time for the 20 nm-thick CuI/β-Ga_2O_3 heterostructure-based DUV light detectors doped with MoO_3 with different MoO_3 thicknesses of (a) 0 nm, (b) 1 nm, (c) 2 nm, (d) 3 nm, and (e) 4 nm.

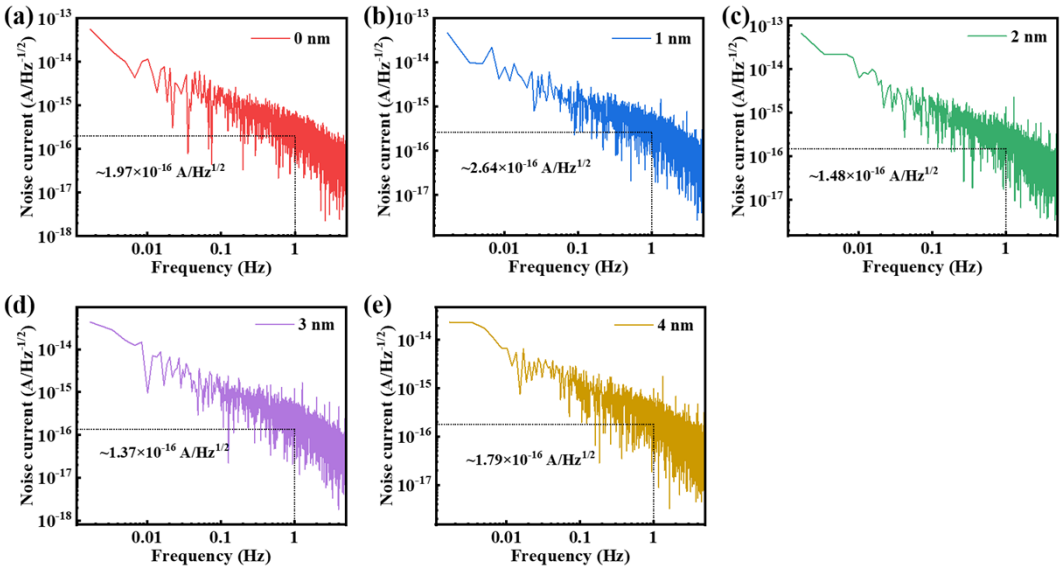

Fig. S8 The noise current as a function of frequency for the 20 nm-thick CuI/β-Ga_2O_3 heterostructure-based DUV light detectors doped with MoO_3 with different MoO_3 thicknesses of (a) 0 nm, (b) 1 nm, (c) 2 nm, (d) 3 nm, and (e) 4 nm.