

Supplementary Data

High-performance 2D/3D hybrid dimensional p-n heterojunction solar cell with reduced recombination rate by an interfacial layer

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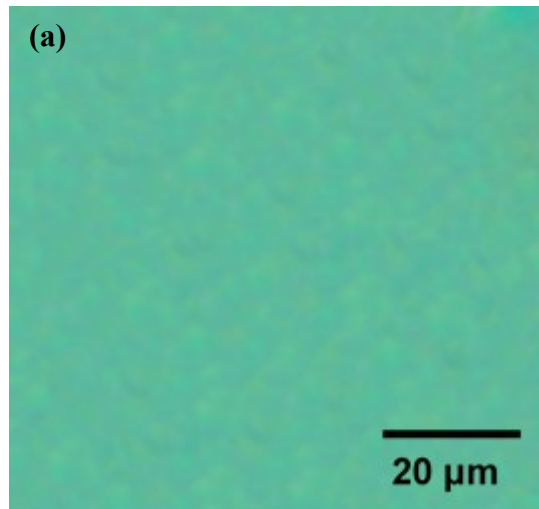


Figure S1. Optical image of MoS₂ on the surface of p-Si

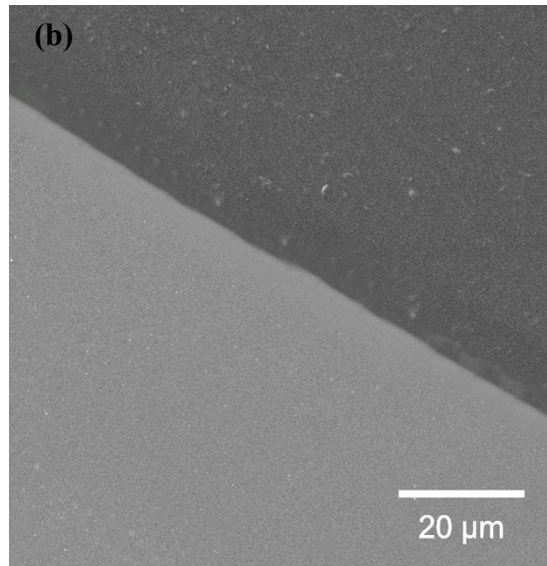


Figure S2. FE-SEM image of MoS₂ on the surface of p-Si

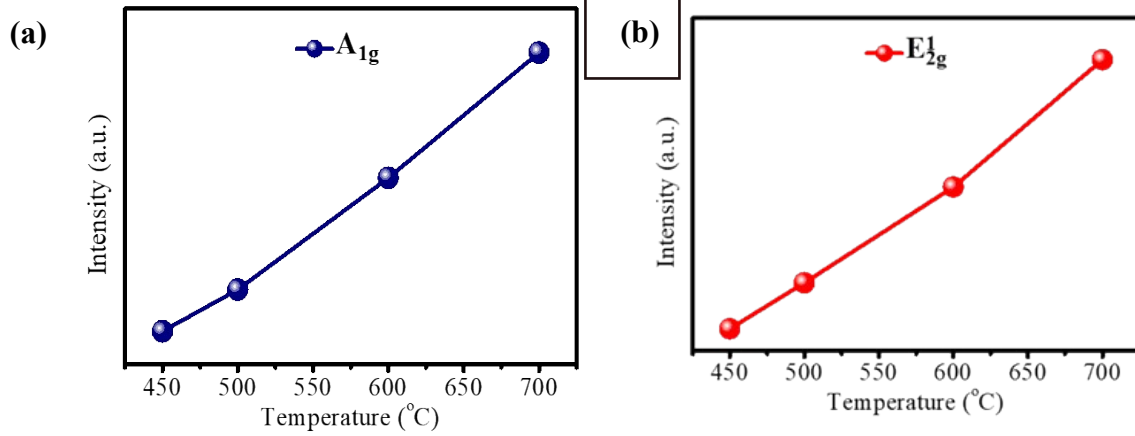


Figure S3. Change in Raman shift with the annealing temperatures, (a) in-plan and (b) out of plan vibration mode

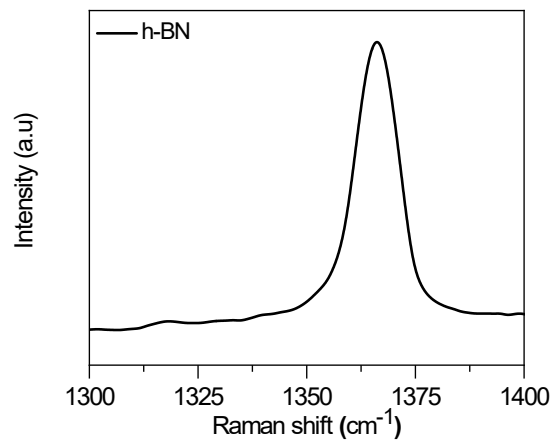


Figure S4. Raman spectroscopy measurement of h-BN

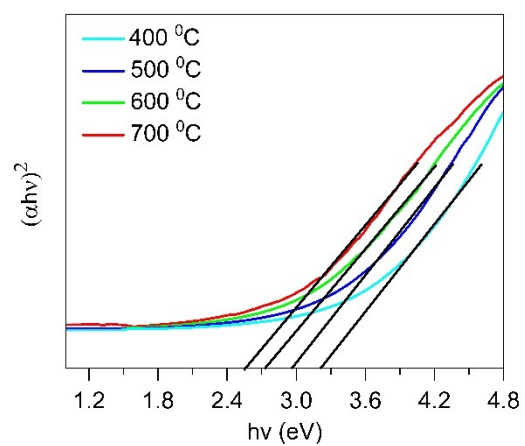


Figure S5. UV-Vis absorption spectrum of few-layered MoS₂ flakes at different temperatures

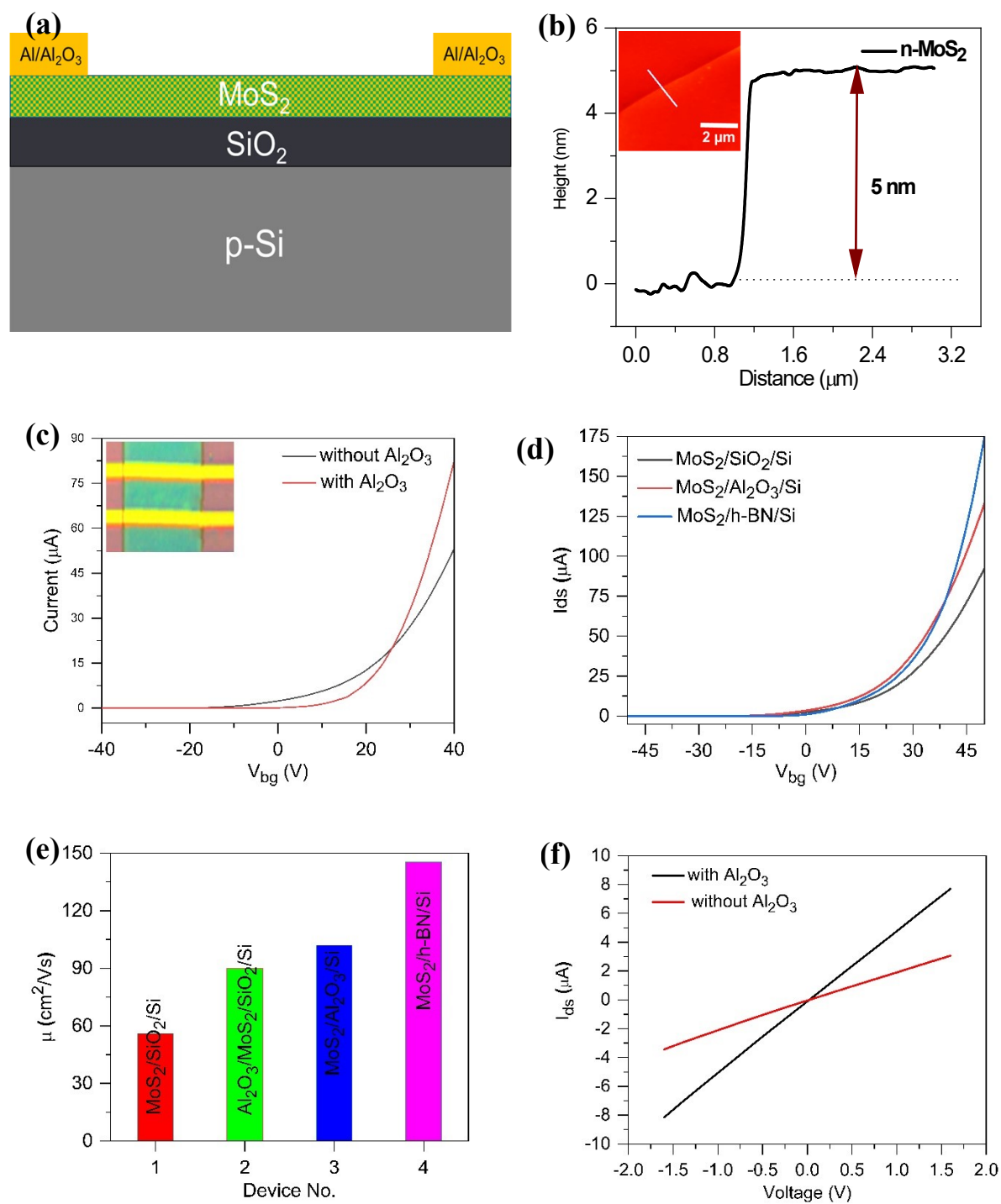


Figure S6. (a) Schematic diagram of MoS₂ field effect transistor with Al₂O₃ as a layer between the metal electrode and MoS₂ junction (b) Height profile to measure the thickness of MoS₂ flake. The inset figure shows the atomic force microscopy image (c) Transfer curves of MoS₂ FET with

and with passivation of Al_2O_3 (d) Transfer curves of MoS_2 FETs with different interfacial layers (e) Change in mobility of MoS_2 FETs with different interfacial layers and passivation (f) Current-voltage characteristics of MoS_2 FETs with and without passivation of Al_2O_3

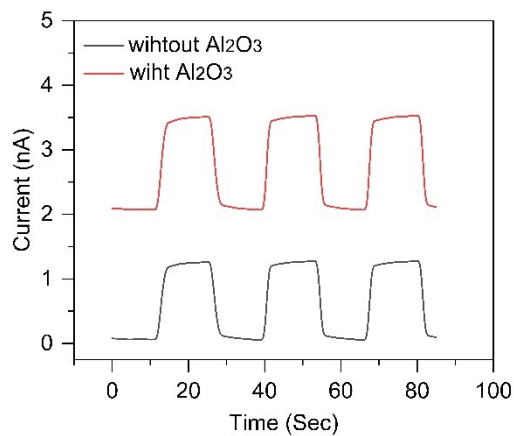


Figure S7. Time-dependent response to measure the effect of passivation on the generation of electron-hole pairs.

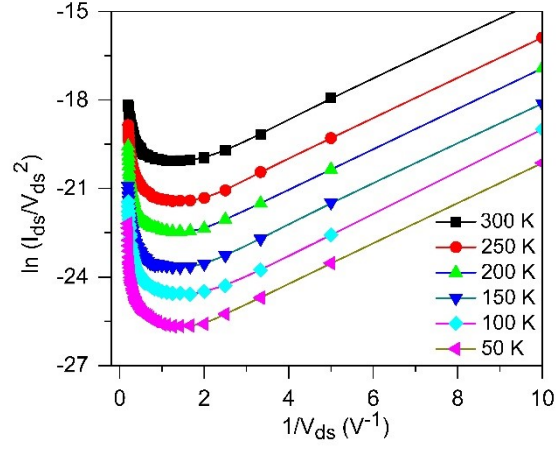


Figure S8. $\ln(I/V^2)$ vs. $1/V$ plots reconfigured from current-voltage curves which were measured at different temperatures.

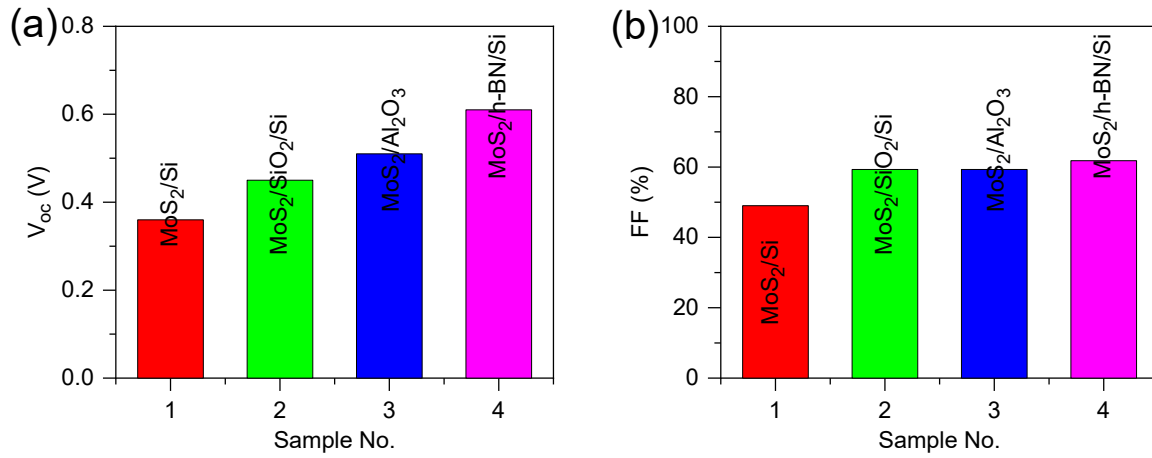


Figure S9. Change in (a) V_{oc} (b) FF