Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Development of bi-compound heterogeneous cocatalyst modified p-Si photocathode for boosting the photoelectrochemical water splitting performance

Zhiwei Chen, Yang Li, Lin Wang, Yuyu Bu,* Jin-Ping Ao

Key Laboratory of Wide Band-Gap Semiconductor Materials and Devices, School of Microelectronics, Xidian University, Xi'an, 710071, China.

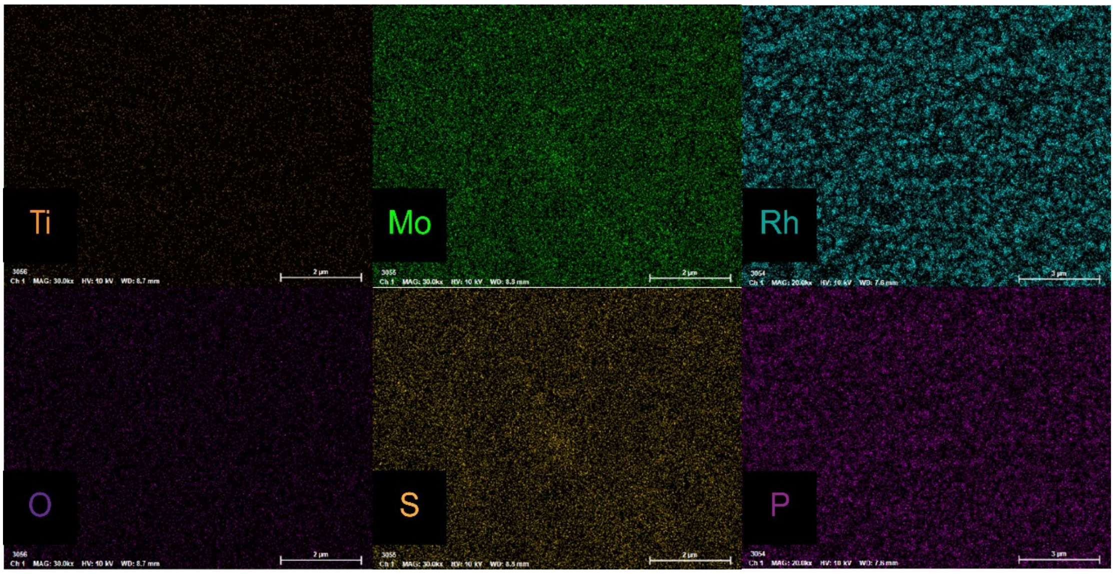

Figure S1. EDS mapping images of p-Si-TiO_2-MoS_2/Rh-P.

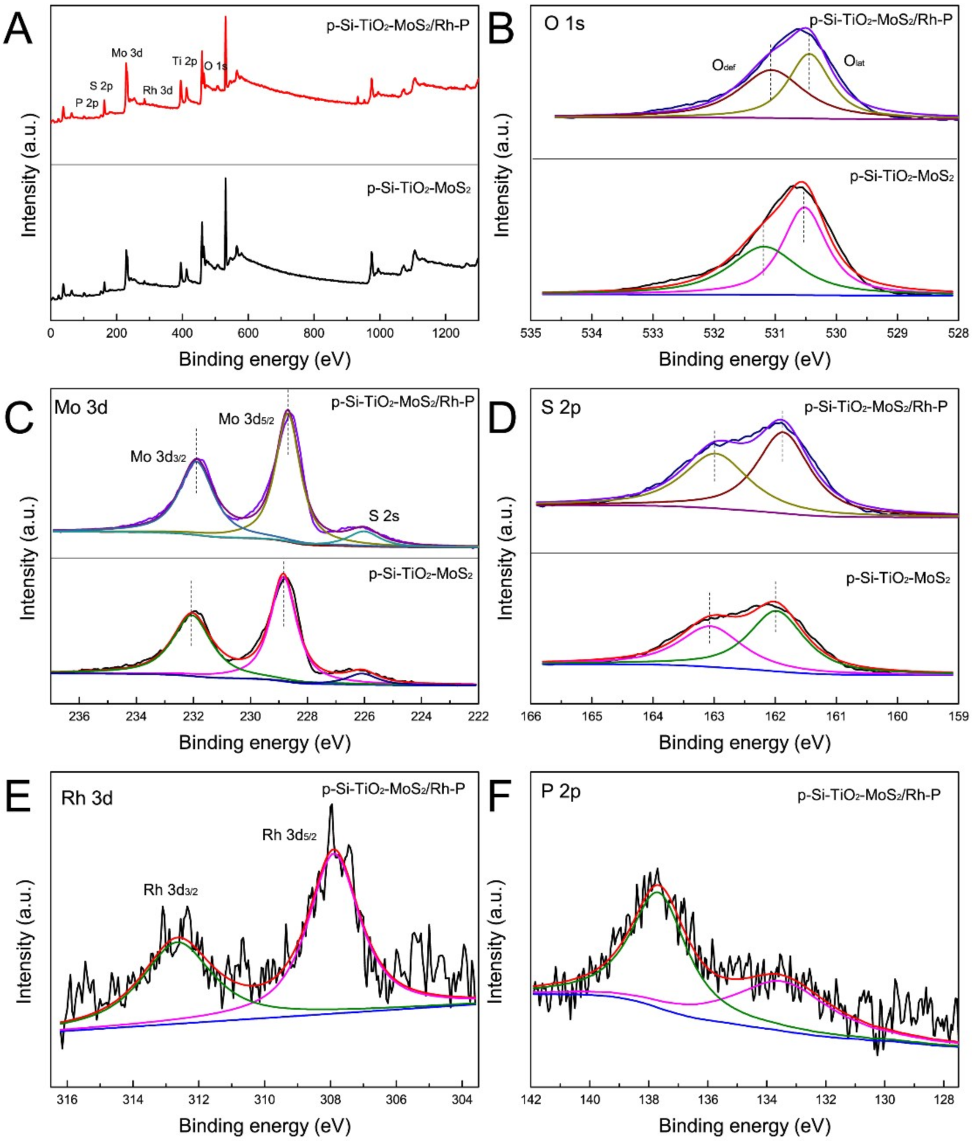

Figure S2. The total XPS survey spectra (A) and high resolution O 1s (B), Mo 3d (C), S 2p (D) XPS spectra of p-Si-TiO_2-MoS_2 and p-Si-TiO_2-MoS_2/Rh-P, high resolution Rh 3d (E) and P 2p (F) XPS spectra of p-Si-TiO_2-MoS_2/Rh-P.

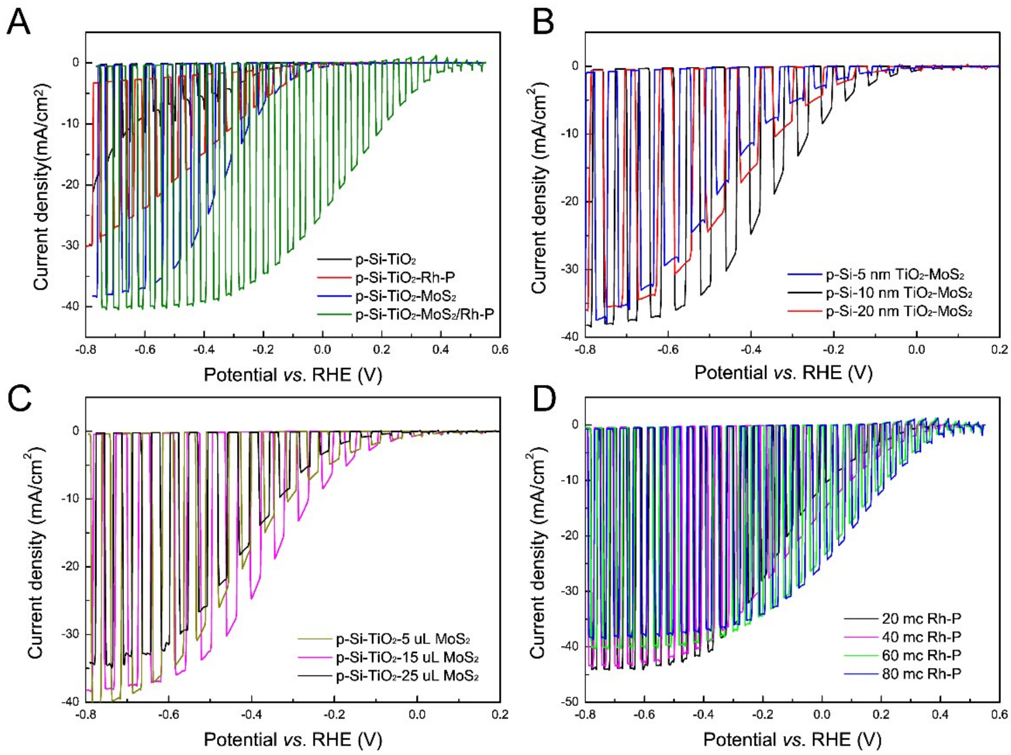

Figure S3. (A) Current density-potential curves of the series photocathodes. Current density-potential curves of p-Si-TiO_2-MoS_2 with different deposition conditions of (B) TiO_2, (C) MoS_2 and (D) Rh-P.

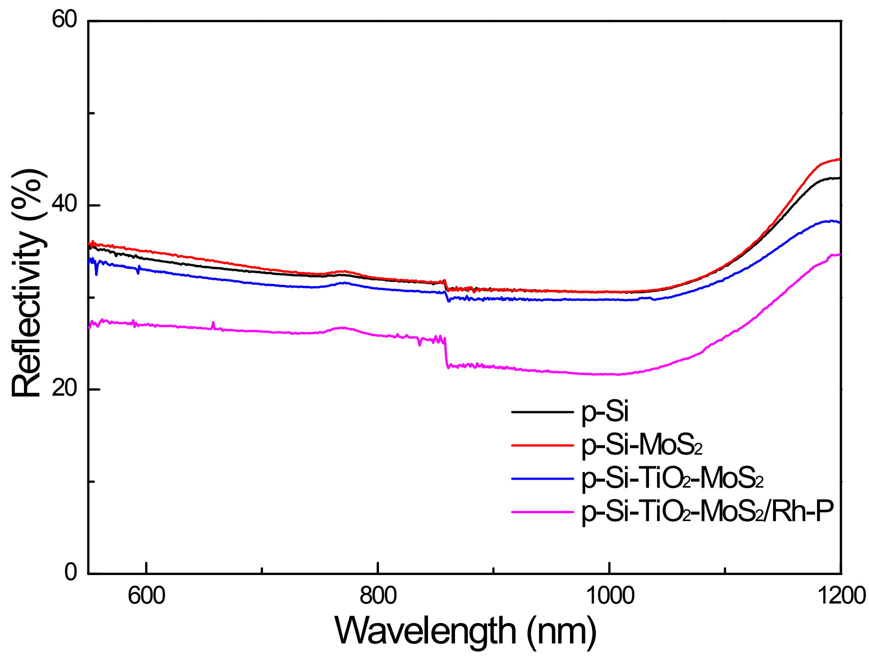

Figure S4. Surface reflectivity of the series photocathodes.

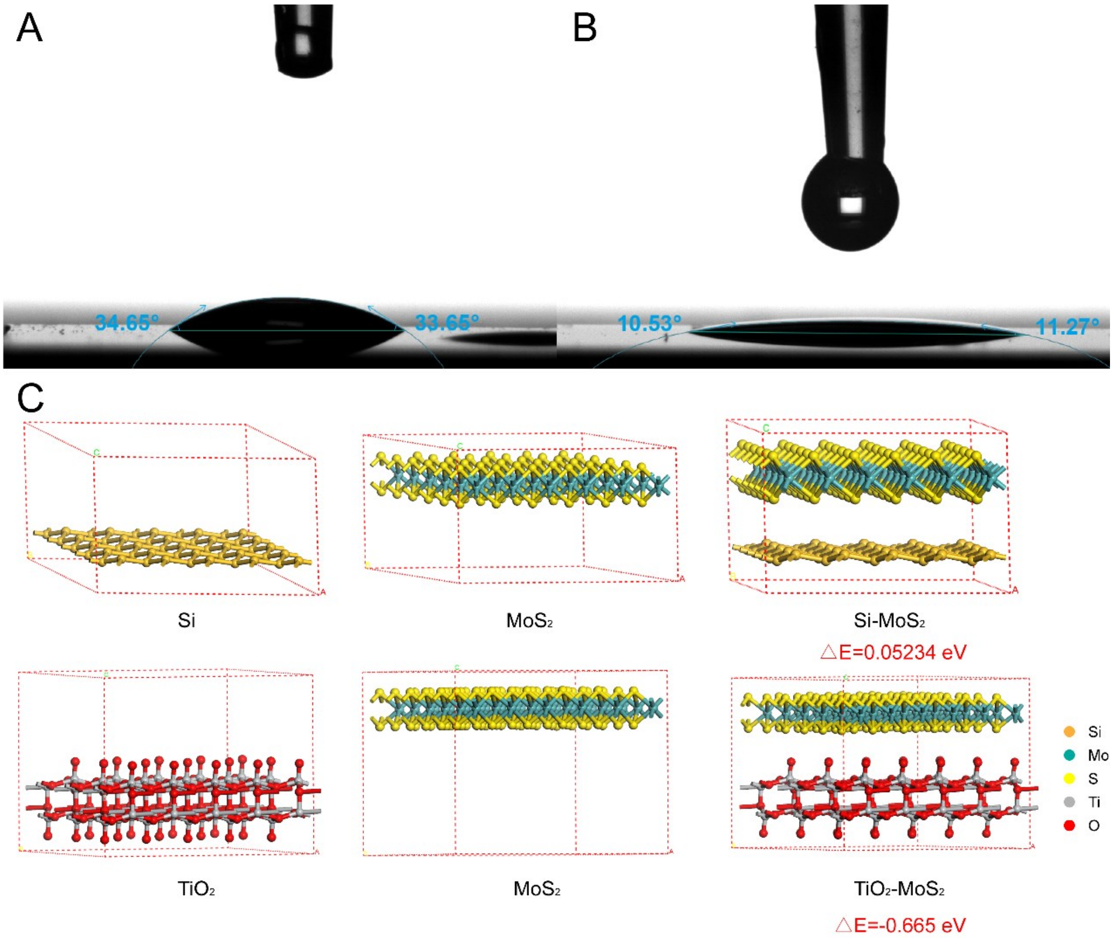

Figure S5. Contact angle test results of (A) p-Si and (B) p-Si-TiO_2, (C) the optimization model for Si, MoS_2, Si-MoS_2, TiO_2 and TiO_2-MoS_2.

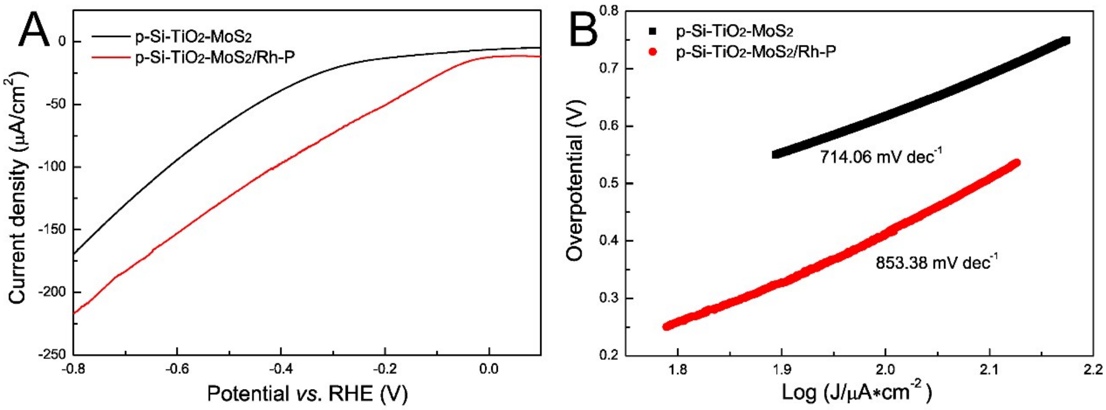

Figure S6. (A) LSV curves of p-Si-TiO_2-MoS_2 and p-Si-TiO_2-MoS_2/Rh-P for HER. (B) The corresponding Tafel plots.

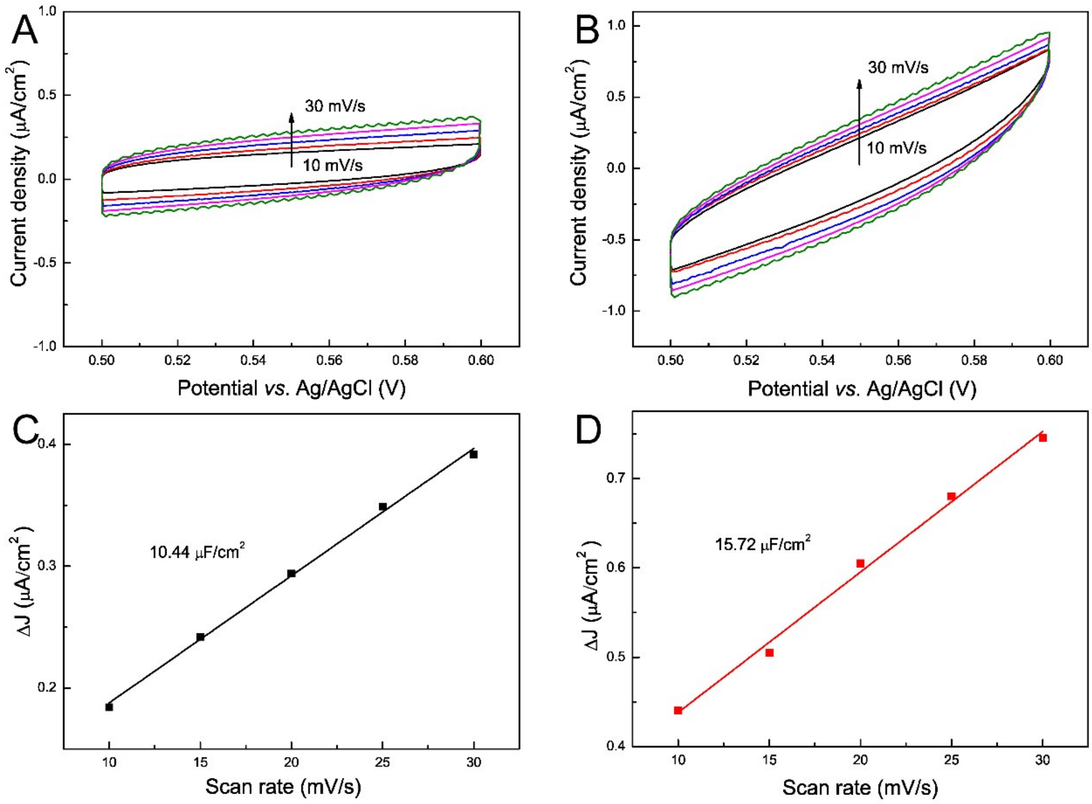

Figure S7. Cyclic voltammograms of (A) p-Si-TiO_2-MoS_2 and (B) p-Si-TiO_2-MoS_2/Rh-P against different scan rates. The corresponding charging current density differences of (C) p-Si-TiO_2-MoS_2 and (D) p-Si-TiO_2-MoS_2/Rh-P.

Table S1. Parameters fitted from the PEIS curves of the series photocathodes.

Sample	R_s (Ω cm^{-2})	R_t (Ω cm^{-2})	R_i (Ω cm^{-2})
p-Si	3.99	12.58 k	\
p-Si-MoS_2	17.08	753.46	\
p-Si-TiO_2-MoS_2	6.66	22.74	49.94
p-Si-TiO_2-MoS_2/Rh-P	6.14	4.90	6.37