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Supporting information

Photocatalytic hydrogen evolution over Pt-Pd dual atomic sites anchored on TiO_2 nanosheets

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Synthesis of Pt SA/Vo-TiO_2 and Pd SA/Vo-TiO_2

A typical method was used to deposit single atoms on the surface of Vo-TiO_2. Dispersed 0.5g Vo-TiO_2 in 100mL deionized water and sonicated for 10 minutes. While stirring, slowly add 12.5 mL $(NH_4)_2CO_3$ (1M) dropwise. After that, 355 μL of H_2PtCl_6 solution (7.2 mM) and 210μL of $PdCl_2$ solution (22.4 mM) were added dropwise to the above solution, respectively. After stirring for 5 hours, it was filtered, washed and vacuum dried at 60°C for 8 hours. The dried powder was treated at 250°C under an argon hydrogen atmosphere (the total flow is 40 mL/min, and the hydrogen to argon flow ratio is 1/9) for 2 hours. The resulting product was labeled Pt SA/Vo-TiO_2 and Pd SA/Vo-TiO_2.

Synthesis of Pt NP/TiO_2 and Pd NP/TiO_2

For comparison, the above treatment was directly performed on TiO_2 without oxygen vacancy, and the resulting product was labeled Pt NP/TiO_2 and Pd NP/TiO_2.

Table S1 ICP analysis of TiO_2, Vo-TiO_2, Pt-Pd NPs/TiO_2 and Pt-Pd SAs/Vo-TiO_2.

Catalysts	Pt (wt.%)	Pd (wt.%)
TiO_2 NS	0	0
Vo-TiO_2	0	0
Pt-Pd NPs/TiO_2	0.09	0.02
Pt-Pd SAs/Vo-TiO_2	0.09	0.02

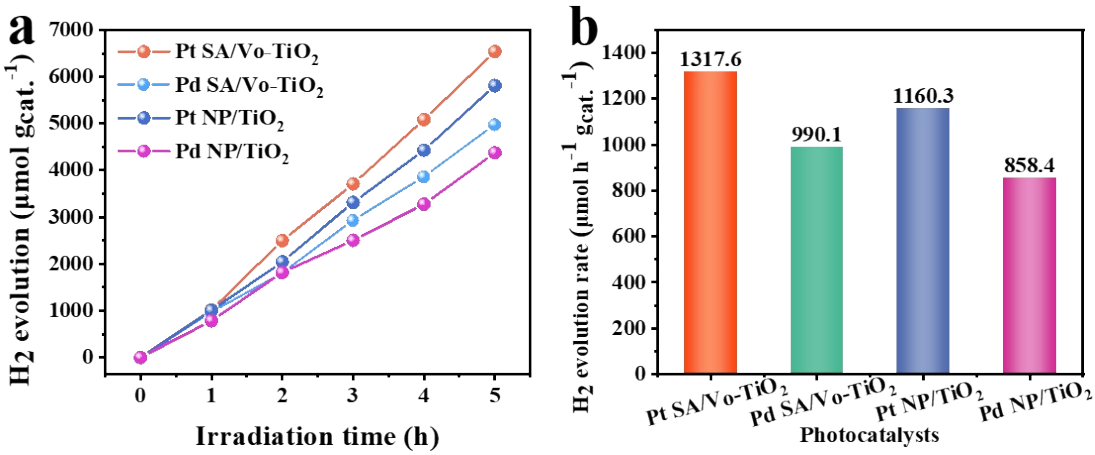

Fig. S1 (a) Photocatalytic H_2 evolution of Pt SA/Vo-TiO_2, Pd SA/Vo-TiO_2, Pt NP/TiO_2 and Pd NP/TiO_2, (b) the photocatalytic activities of all catalysts for H_2 evolution rate.

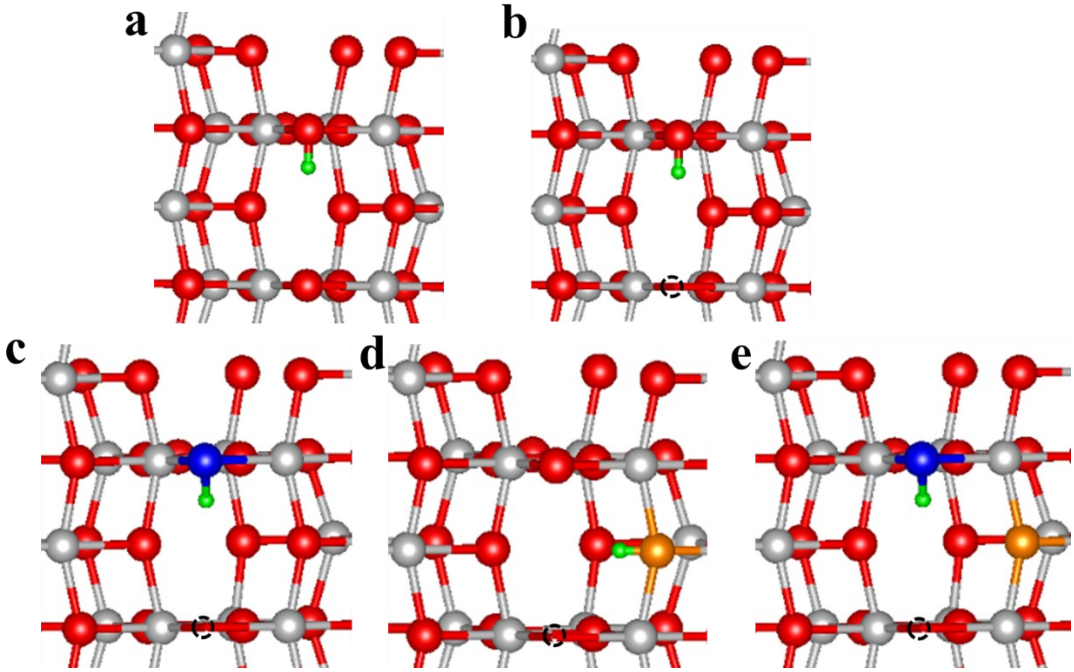

Fig. S2 Geometrical structures of H adsorption on (a) TiO_2, (b) Vo-TiO_2, (c) Pt SA/Vo-TiO_2, (d) Pd SA/Vo-TiO_2 and (e) Pt-Pd SAs/Vo-TiO_2 (Ti: grey, O: red, Pt: blue, Pd: orange, H: green).