## Supporting Information

## Interaction at the silicon/transition metal oxide heterojunction interface and its effect on the photovoltaic performance

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**Figure S1** (a) The Mo 3d peak of the  $MoO_{3-x}$  thin film. (b)The W 4f peak of the  $WO_{3-x}$  thin film. (c) The V 2p peak of the  $V_2O_{5-x}$  thin film.

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**Figure S2** (a) the band structure of WO<sub>3</sub>. (b) The band structure of  $V_2O_{5-x}$ . In these two materials, the vacuum level, conduction and valance band are the same on H-Si and CH<sub>3</sub>-Si.