

## **Supporting Information:**

### **Solution-processed PSS:MoO<sub>x</sub> composite thin film with triple-function: passivation, antireflection and hole-selective transport for application into IBC solar cells**

Kunpeng Ge<sup>1</sup>, Wenqian Zhang<sup>1</sup>, Xin Zhou<sup>1</sup>, Linlin Yang<sup>1</sup>, Jianxin Guo<sup>1</sup>,

Feng Li<sup>3</sup>, Ying Xu<sup>1</sup>, Xueliang Yang<sup>1,2\*</sup>

1. Hebei Key Lab of Optic-electronic Information and Materials, College of Physics Science and Technology, Hebei University, Baoding 071002, China

2. Department of Science and Technology, Hebei University, Baoding 071002, China

3. State Key Laboratory of Photovoltaic Materials and Technology, Yingli Green Energy Holding Co., Ltd, Baoding 071051, China

**Keywords:** crystalline silicon; passivation; surface engineering; functional group; the sulfonic functional group

**Corresponding authors:** yangxl1987@hbu.edu.cn(X. Yang)

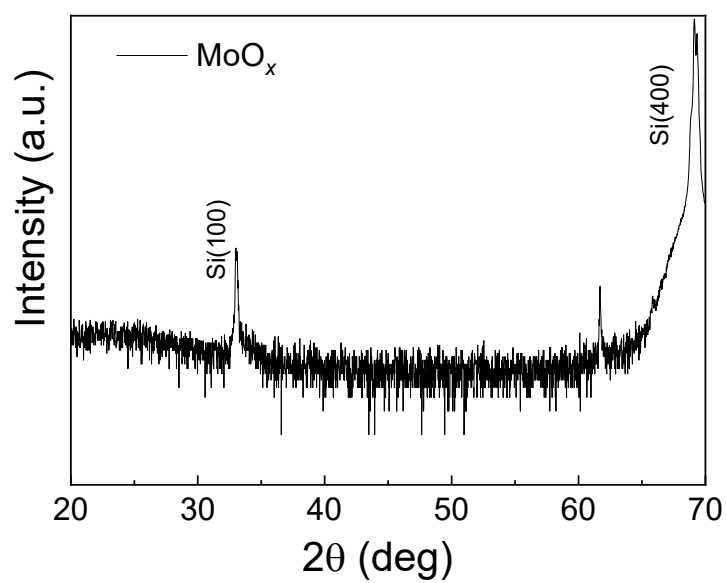


Figure 1 XRD graphic of MoO<sub>x</sub> thin film

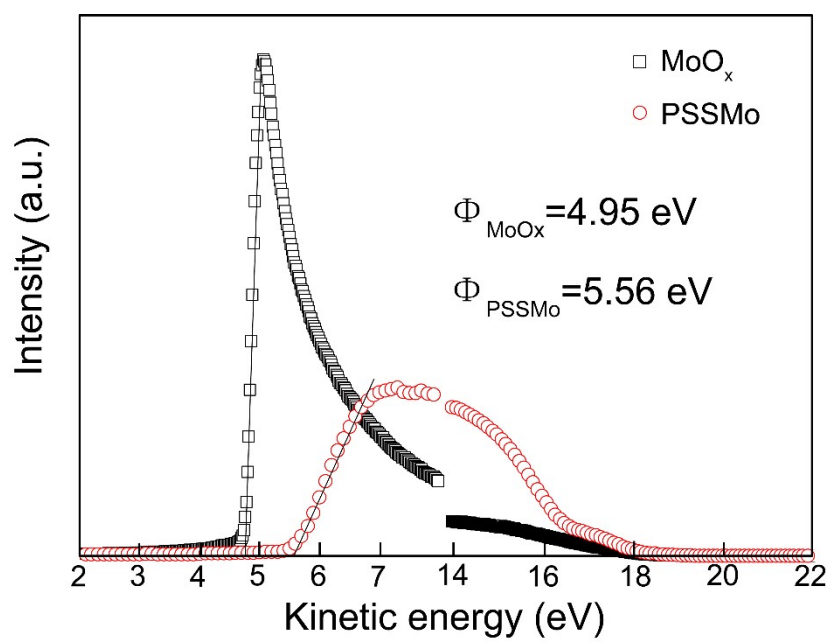


Figure S2 Typical He I ( $h\nu = 21.22 \text{ eV}$ ) UPS spectrum of MoO<sub>x</sub> (250 nm) thin film taken with 30.0 V bias applied to the sample

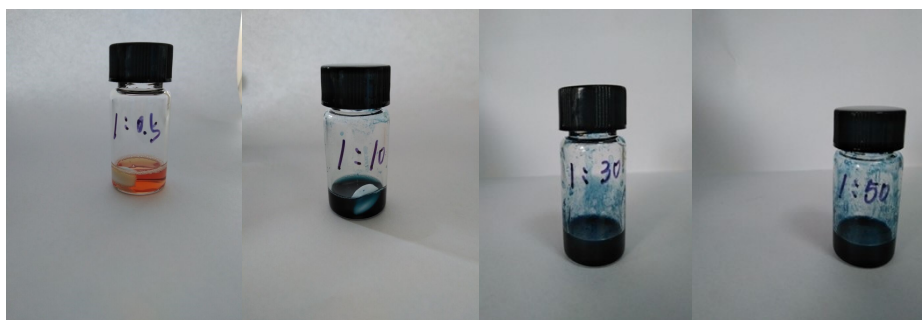


Figure S3 the mixed PSS:MoO<sub>x</sub> solutions with different molar ratios (the molar ratio of PSS to MoO<sub>x</sub> (1:x), where x is equal to 0.5, 10, 30, 50)

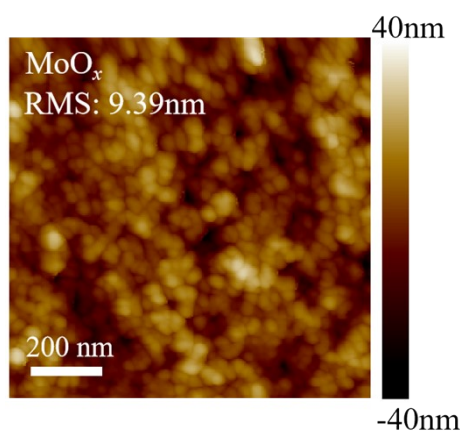


Figure S4 The AFM surface morphologies of MoO<sub>x</sub> thin film on Si substrate with RMS of 9.39 nm