

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Valence Band Dispersion of Perovskite Single Crystal Observed by Angle-resolved Photoemission Spectroscopy<sup>1</sup>** CONGCONG WANG, BENJAMIN ECKER, YONGLI GAO, University of Rochester, HAOTONG WEI, JINSONG HUANG, University of Nebraska-Lincoln, JIAN-QIAO MENG, Central South University — The electronic structure of the cleaved perovskite ( $\text{CH}_3\text{NH}_3\text{PbBr}_3$ ) single crystal was studied in an ultra-high vacuum (UHV) system by angle-resolved photoemission spectroscopy (ARPES) and inverse photoelectron spectroscopy (IPES). Highly reproducible dispersive features of the valence bands were observed with nice symmetry about the Brillouin zone center and boundaries. The largest dispersion width was found to be about 0.73 eV and 0.98 eV along the  $\Gamma X$  and  $\Gamma M$  directions, respectively. The measured band dispersions correspond to an effective hole mass as about  $0.59m_0$  and a lower limit of the hole mobility of  $33.90 \text{ cm}^2\text{V}^{-1}\text{s}^{-1}$  from the tight-binding fitting. The quality of the surface was verified by atomic force microscopy (AFM) and scanning electron microscope (SEM). The elemental composition was investigated by high resolution x-ray photoelectron spectroscopy (XPS). The experimental electronic structure shows a good agreement with the theoretical calculation.

<sup>1</sup>The authors thank the supports from National Science Foundation and National Natrual Science Foundation of China.

Congcong Wang  
University of Rochester

Date submitted: 10 Nov 2016

Electronic form version 1.4