Supplementary Information

Efficient planar Sb$_2$S$_3$ solar cells using a low-temperature solution-processed tin oxide electron conductor

Hongwei Lei$^{a,b}$, Guang Yang$^a$, Yaxiong Guo$^a$, Liangbin Xiong$^a$, Pingli Qin$^a$, Xin Dai$^a$, Xiaolu Zheng$^a$, Weijun Ke$^a$, Hong Tao$^a$, Zhao Chen$^a$, BoruiLi$^a$, Guojia Fang$^{a,b,*}$

$^a$Key Lab of Artificial Micro- and Nano-Structures of Ministry of Education of China, Department of Electronic Science & Technology, School of Physics and Technology, Wuhan University, Wuhan 430072, People’s Republic of China

$^b$Wuhan University, Suzhou Institute, Suzhou 215123, People’s Republic of China

E-mail: gjfang@whu.edu.cn; Tel: +86 (0)27 87642784; Fax: +86 (0)27 68752569
Figure S1 Typical EDS spectrum of Sb$_2$S$_3$ fabricated on quartz glass.

In Figure S1, we can see the results of EDS analysis, which proves that the weight ratio and atomic ratio of elemental antimony and sulphur is approximately 8:3 and 2:3, respectively. The other elements are attributed to the quartz glass substrate.
Figure S2 The statistics of photovoltaic-parameters for (a) open-circuit voltages ($V_{OC}$), (b) short-circuit current density ($J_{SC}$), (c) fill factor (FF) and (d) power conversion efficiency (PCE) obtained from 30 solar cells measured under AM 1.5G illumination through a shadow mask (0.09 cm$^2$).

Figure S2 summarize the statistics of photovoltaic-parameters of planar Sb$_2$S$_3$ sensitized solar cells based on different electron conductors.
Figure S3 Typical $J-V$ plots of planar solar cells with an architecture of FTO/SnO$_2$/P3HT/Au.

Device with an architecture of FTO/SnO$_2$/P3HT/Au showed no photovoltaic performance under AM 1.5 illumination, which proved that P3HT HC made no contribution to the photocurrent to the planar Sb$_2$S$_3$ sensitized solar cells.