Significant Enhancing the Stability of Cu$_2$ZnSnS$_4$ Aqueous/ethanol-based Precursor Solution and Its Application in Cu$_2$ZnSn(S,Se)$_4$ Solar cells

Zhen-Yu Xiao, Yong-Feng Li, Bin Yao, Zhan-Hui Ding, Rui Deng, Hai-feng Zhao, Li-gong Zhang, Zhen-zhong Zhang

*a Key Laboratory of Physics and Technology for Advanced Batteries (Ministry of Education), College of Physics, Jilin University, Changchun, 130012, China

b State Key Lab of Superhard Materials, College of Physics, Jilin University, Changchun 130012, China

c School of Materials Science and Engineering, Changchun University of Science and Technology, Changchun, 130022, China

d State Key Laboratory of Luminescence and Applications, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, No. 3888 Dongnanhu Road, Changchun 130033, PR China

* E-mail: liyongfeng@jlu.edu.cn and binyao@jlu.edu.cn
Fig. S1. EDS patterns of as-fabricated (a) and selenized (b) CZTS-A which was fabricated by spin-coating the precursor solution without MPA. The insets show the compositions.
Fig. S2. EDS patterns of as-fabricated and selenized CZTS-B which was fabricated by spin-coating the precursor solution with MPA. The insets show the compositions.