#Supplementary Material (ESI) for Journal of Materials Chemistry

Synthesis of Two-Dimensional Single-Crystal Berzelianite Nanosheets and Nanoplates with Near-Infrared Optical Absorption

Zhengtao Deng, Masud Mansuripur, and Anthony J. Muscat

Department of Chemical and Environmental Engineering and College of Optical Sciences, The University of Arizona, Tucson, AZ 85721, USA

To whom correspondence should be addressed. E-mail: dengz@email.arizona.edu

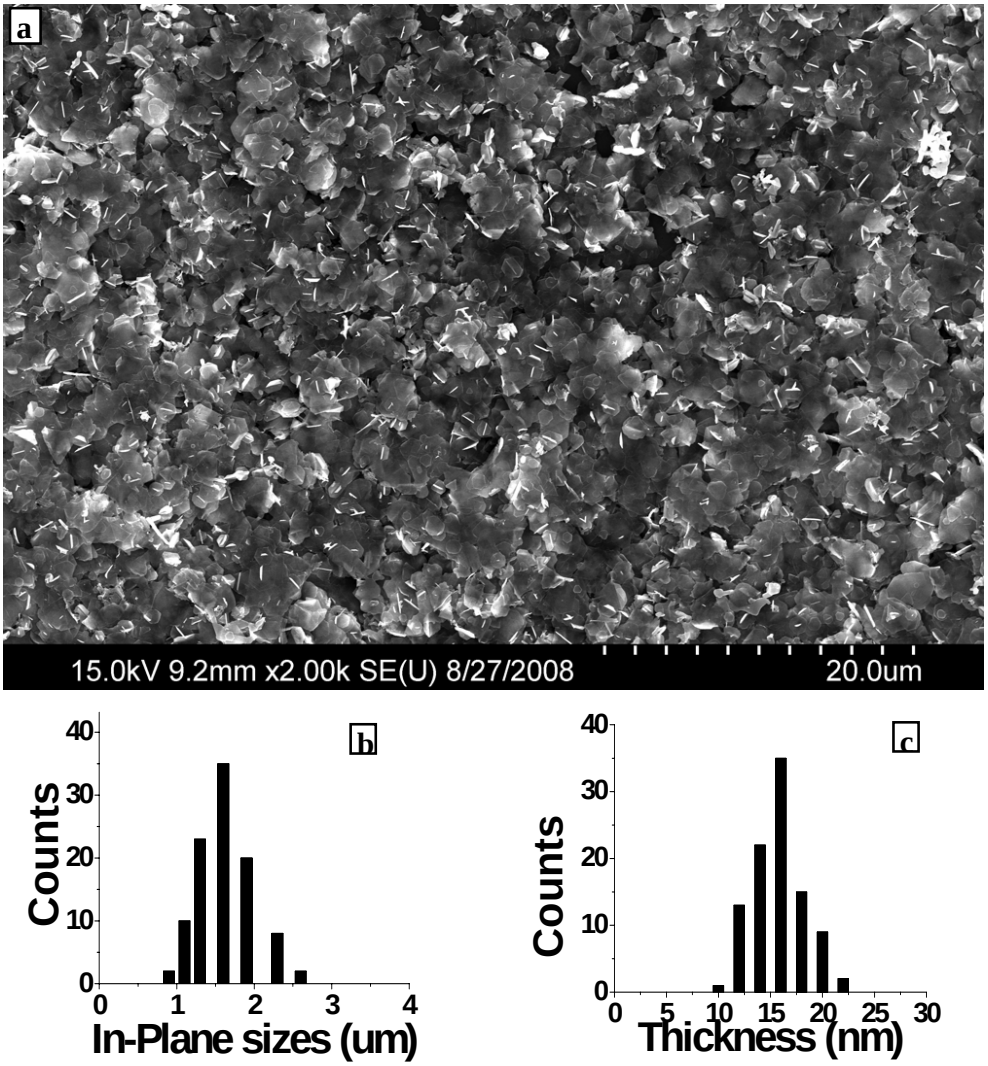

Fig. S1 (a) SEM images of $Cu_{2-x}Se$ nanosheets show that great deals of nanosheets are synthesized with uniform morphology and size; (b) In-plane diameter distribution histograms of the $Cu_{2-x}Se$ nanosheets with more than 100 nanosheets calculated; (c) Thickness distribution histograms of the $Cu_{2-x}Se$ nanosheets with more than 100 nanosheets calculated.

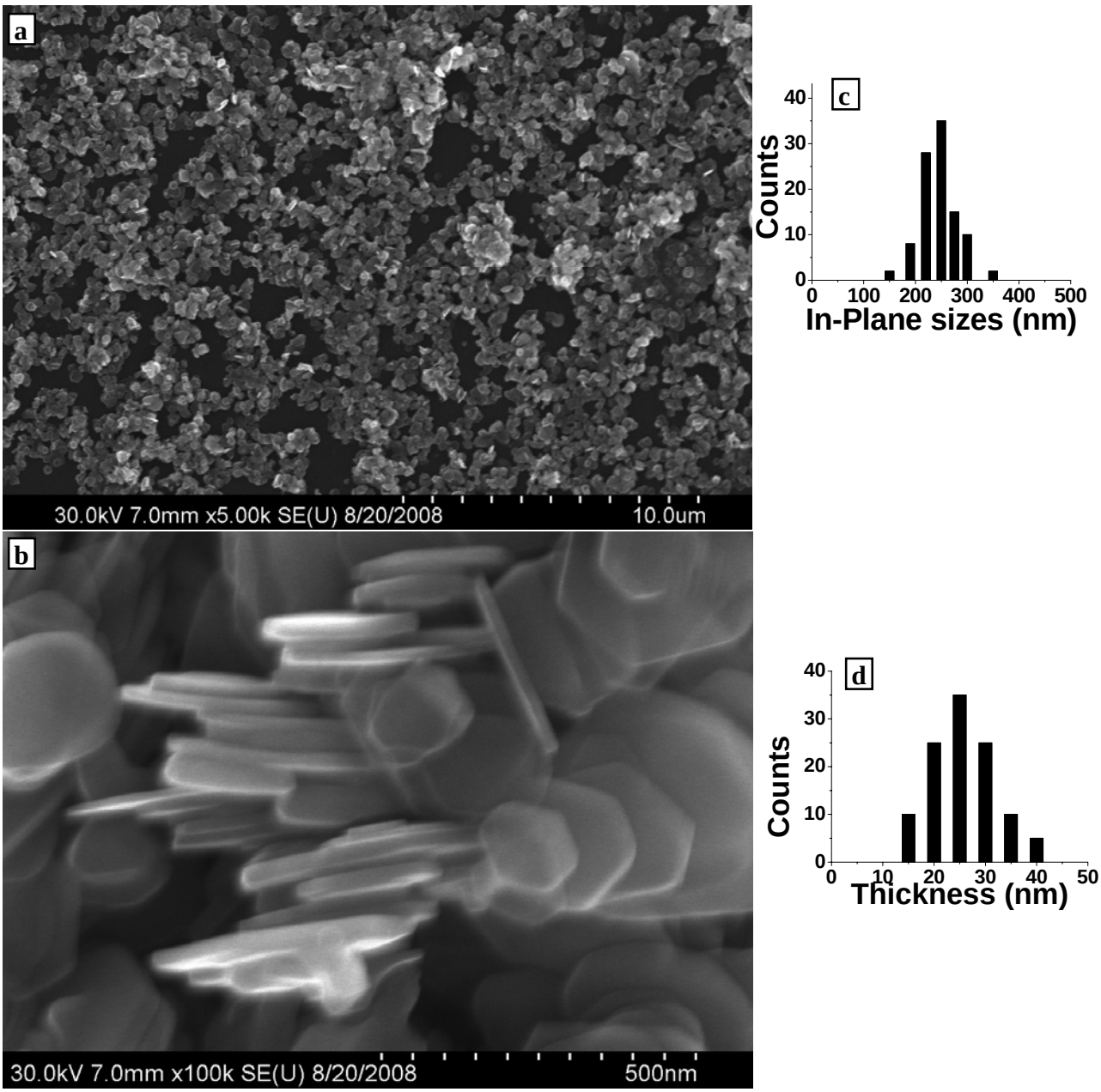

Fig. S2 (a, b) SEM images of $Cu_{2-x}Se$ nanoplates show that great deals of nanoplates are synthesized with uniform morphology and size; (c) In-plane diameter distribution histograms of the $Cu_{2-x}Se$ nanoplates with more than 100 nanoplates calculated; (d) Thickness distribution histograms of the $Cu_{2-x}Se$ nanoplates with more than 100 nanoplates calculated.

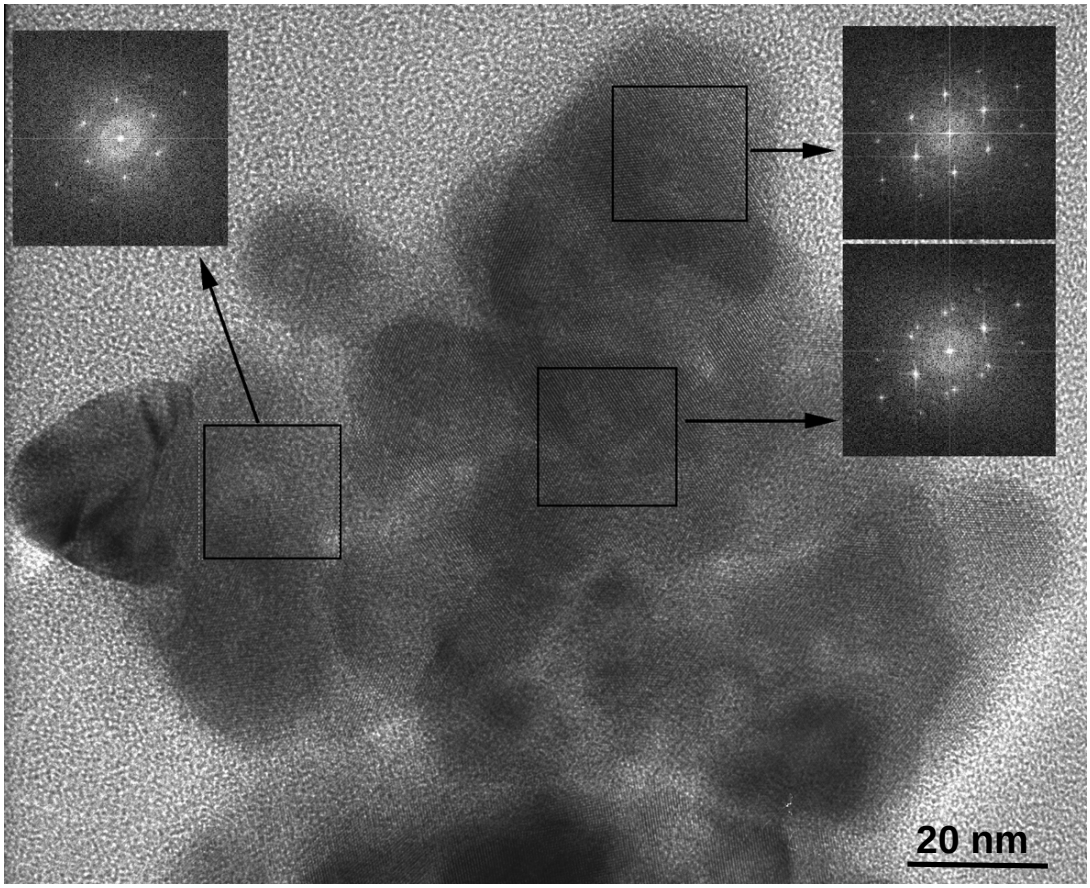

Fig. S3 HRTEM image and its corresponding fast Fourier transforms (FFTs) of the middle product in the formation of the $Cu_{2-x}Se$ nanosheets products harvested at the 250^{o}C after t = 3 minutes reaction time, showing the obvious "oriented attachment" growth process.

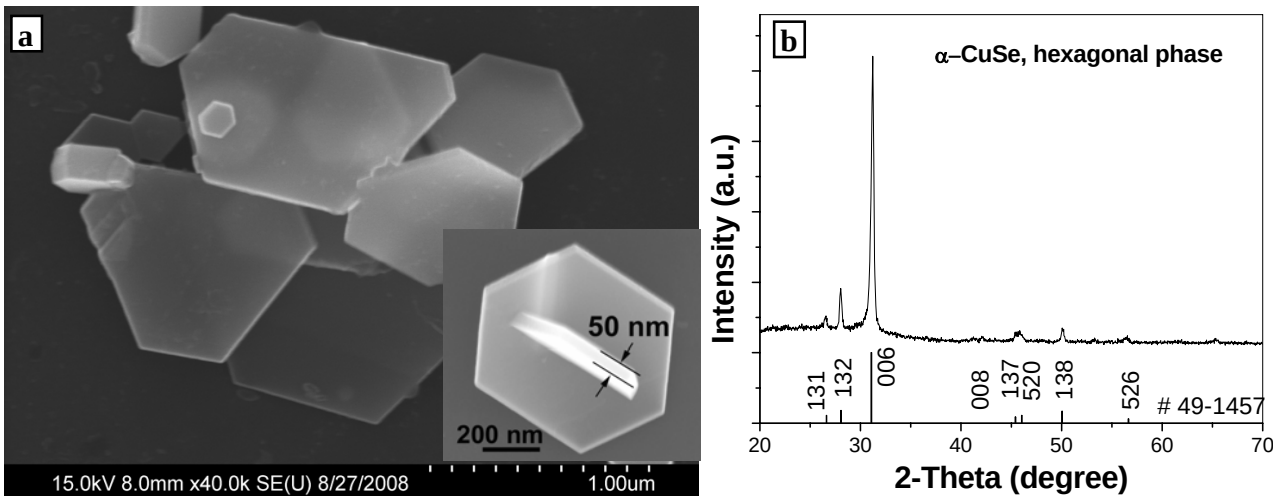

Fig. S4 SEM images (left) and XRD pattern (right) of the α-CuSe microplates, using $Cu(NO_3)_2$ instead of CuCl as the precursor with Cu:Se=2:1, while keeping the other parameter the same as the $Cu_{2-x}Se$ nanosheets. Note that the in-plane diameter of the typical microplates is about 500 nm, while the thickness is about 50 nm.

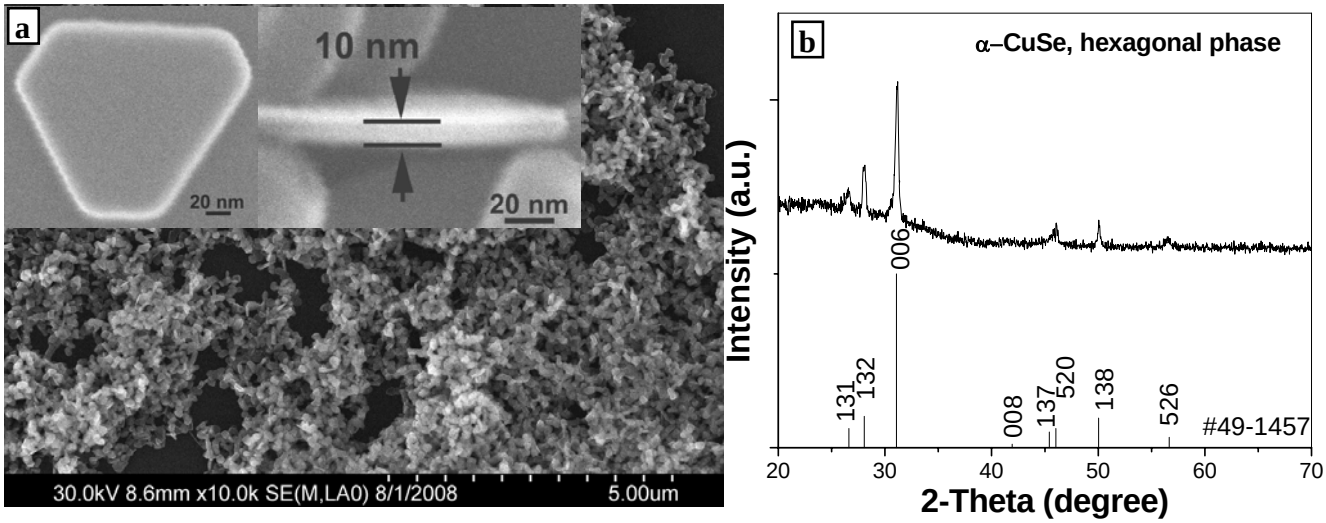

Fig. S5 SEM images (left) and XRD pattern (right) of the α-CuSe nanoplates, using $Cu(NO_3)_2$ instead of CuCl as the precursor with Cu:Se=1:1, while keeping the other parameter the same as the $Cu_{2-x}Se$ nanoplates. Note that the in-plane diameter of the nanoplates is about 100 nm, while the thickness is about 10 nm.