Supporting information for

Flux-boosted coating of idiomorphic $CuInS_2$ crystal layer on Mo-coated glass substrate

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Table S1 Fabrication conditions of $CuInS_2$ crystal layers on under-layer/Mo/SLG from $InCl_3$-NaCl flux.

Run No.	Solute Conc. (mol%)	Solute		Flux		Holding temp. / °C	Holding time / h	Under-layer
		Cu_2S / g	In_2S_3 / g	$InCl_3$ / g	NaCl / g			
1	50	0.2081	0.4261	0.2893	0.0764	550	1	none
2	70	0.2631	0.5387	0.1567	0.0414	550	1	In
3	70	0.2631	0.5387	0.1567	0.0414	550	1	Cu
4	70	0.2368	0.5387	0.1567	0.0414	550	1	In_2S_3
5	70	0.2368	0.5387	0.1567	0.0414	550	1	Cu_2S

Table S2 Crystal Data and Structure Refinement for $CuInS_2$. (J. D. Burnett, et al., *Mater. Chem. Phys.,* 2014, **147**, 17).

compound	$CuInS_2$
fw	242.496
T (K)	300
wavelength (Å)	1.066 or 2.665
cryst syst	tetragonal
space group	I -4 2 d
a (Å)	5.52406(9)
b (Å)	5.52406(9)
c (Å)	11.1429(2)
vol. (Å^3)	340.03
Z	4
R_{int}	0.0477

Table S3 Solubility of Cu_2S and $CuInS_2$ in NaCl-$InCl_3$ flux at 400 °C.

Entry	Sample	Solubility in NaCl-$InCl_3$ (mol %)
1	In_2S_3	Not determined [a]
2	Cu_2S	0.648
3	$CuInS_2$	0.208

[a] In_2S_3 block (10×10×5 mm), used as starting sample, became finely crushed through the test, indicating high solubility of In_2S_3 in NaCl-$InCl_3$ flux.

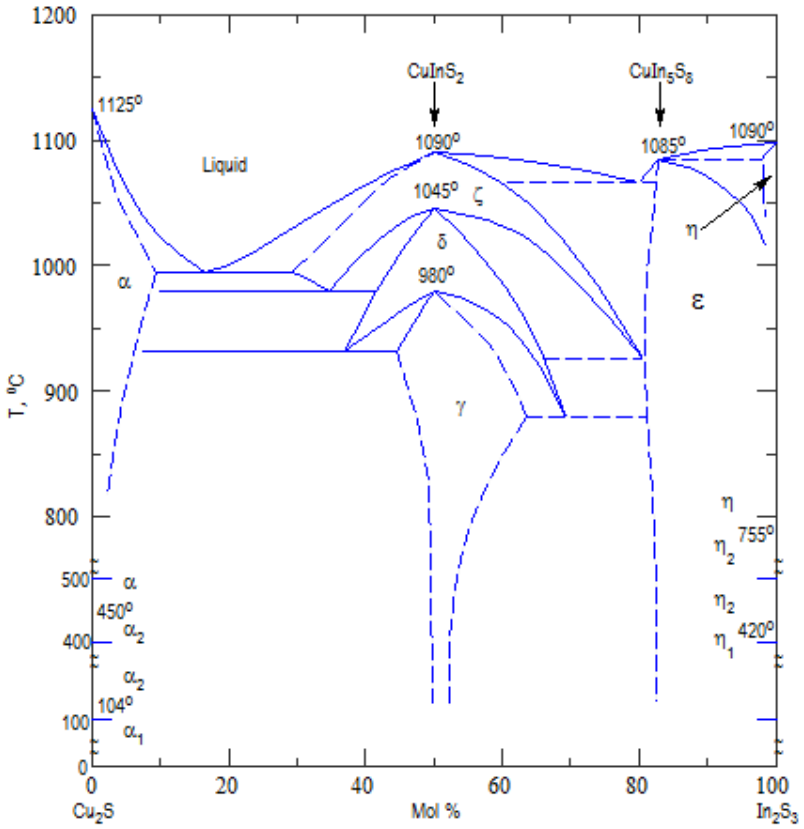

Figure S1. Phase diagram of Cu-In-S compounds (J. J. M. Binsma, L. J. Giling, and J. Bloem, *J. Cryst. Growth,* 1980, **50**, 429). γ, δ, ζ represent chalcopyrite, zincblende, and unknown structures, respectively.

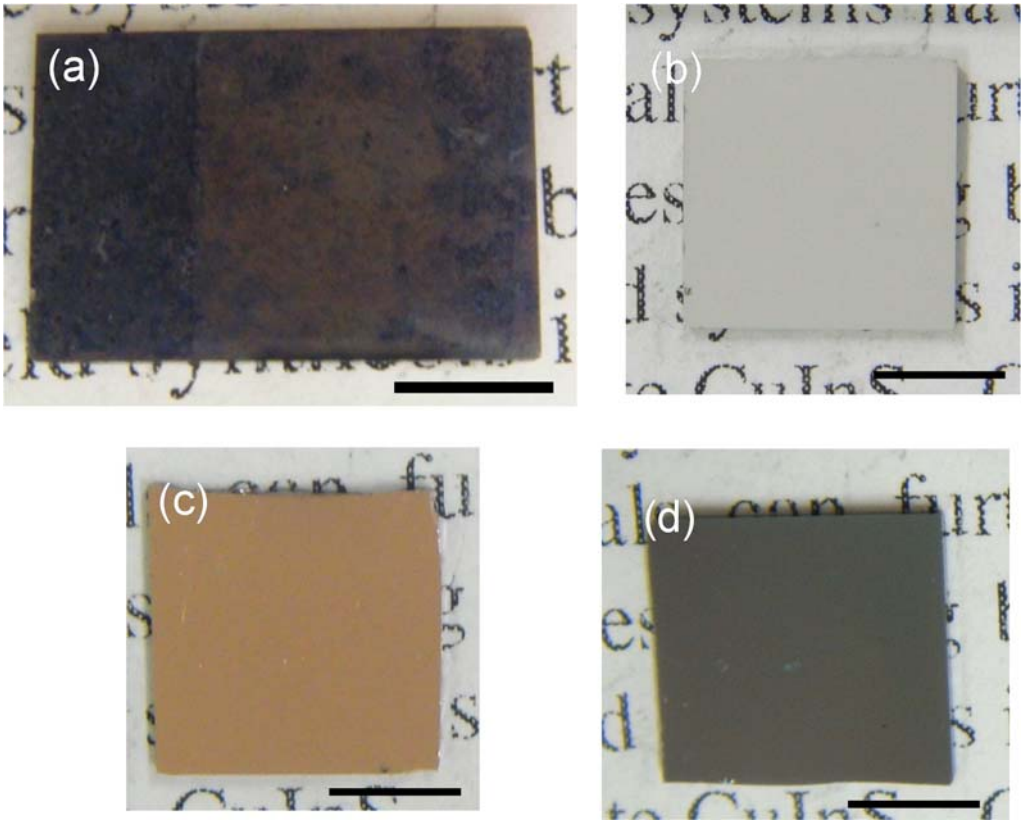

Figure S2. Optical images of (a) Mo/SLG), (b) In/Mo/SLG, (c) Cu/Mo/SLG, (d) Cu_2S/Mo/SLG. All scale bars represent 5 mm in length.

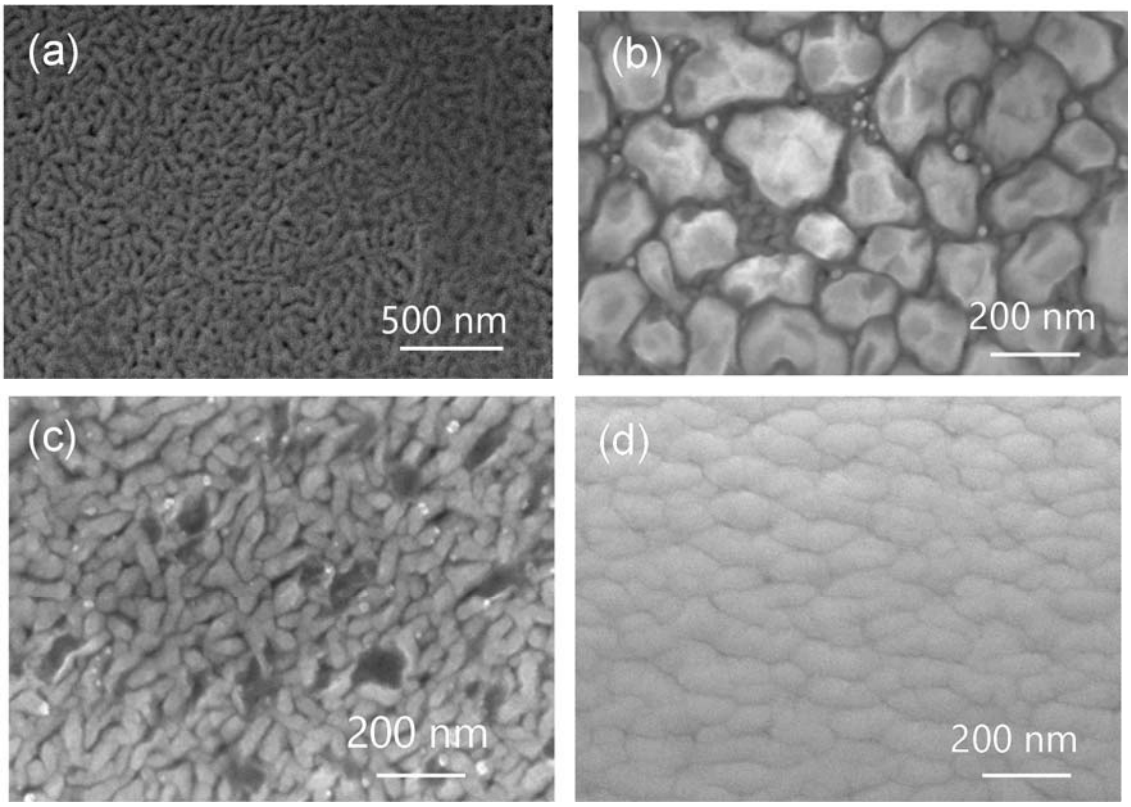

Figure S3. Top-surface FE-SEM images of (a) Mo/SLG, (b) In/Mo/SLG, (c) Cu/Mo/SLG, (d) Cu_2S/Mo/SLG.

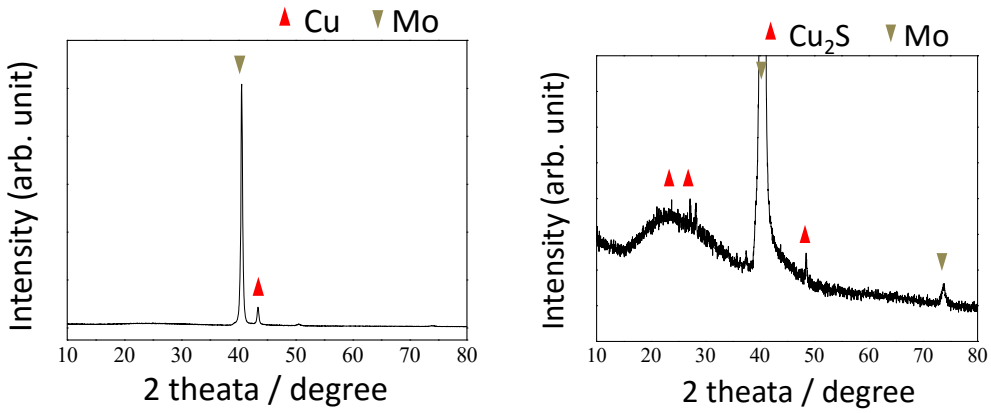

Figure S4. XRD patterns of (left) Cu/Mo/SLG and (right) Cu_2S/Mo/SLG substrate.

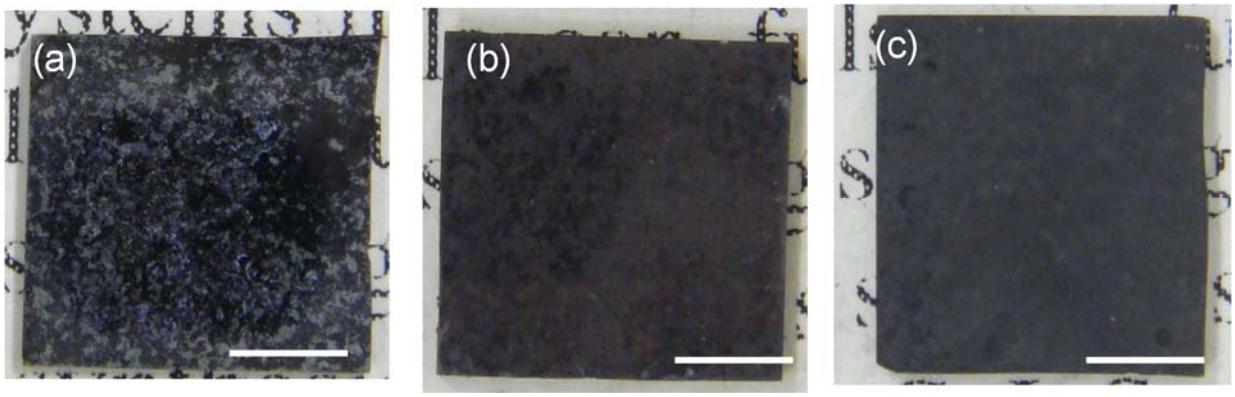

Figure S5. Optical images of $CuInS_2$ crystals grown on (a) In/Mo/SLG, (b) Cu/Mo/SLG, and (c) Cu_2S/Mo/SLG. All scale bars represent 5 mm in length.

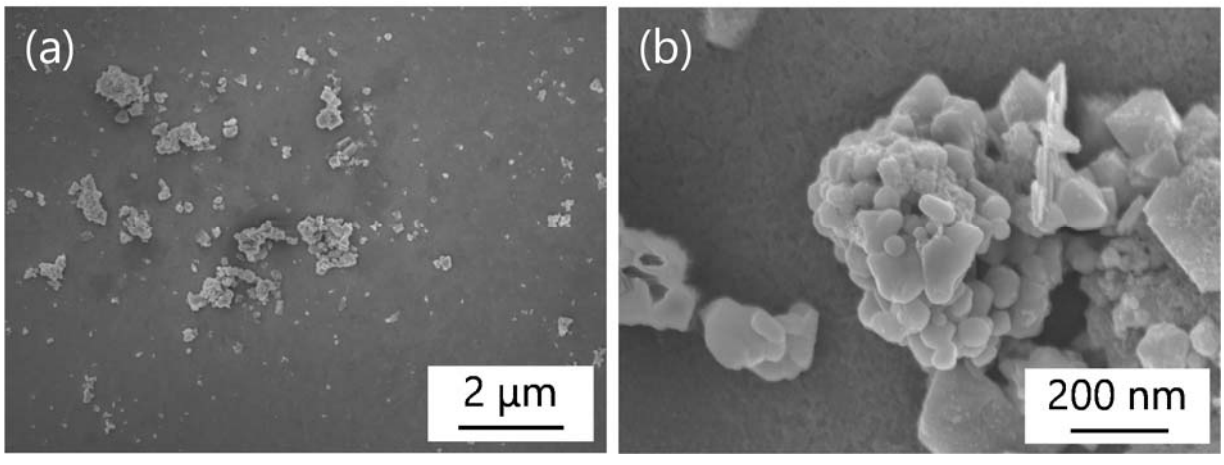

Figure S6. Top-surface FE-SEM images of $CuInS_2$ crystals grown on In_2S_3/Mo/SLG substrate.