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Supplementary Materials

Solution Deposition of High-Quality $AgBiS_2$ Thin-Films via a Binary Diamine-Dithiol Solvent System

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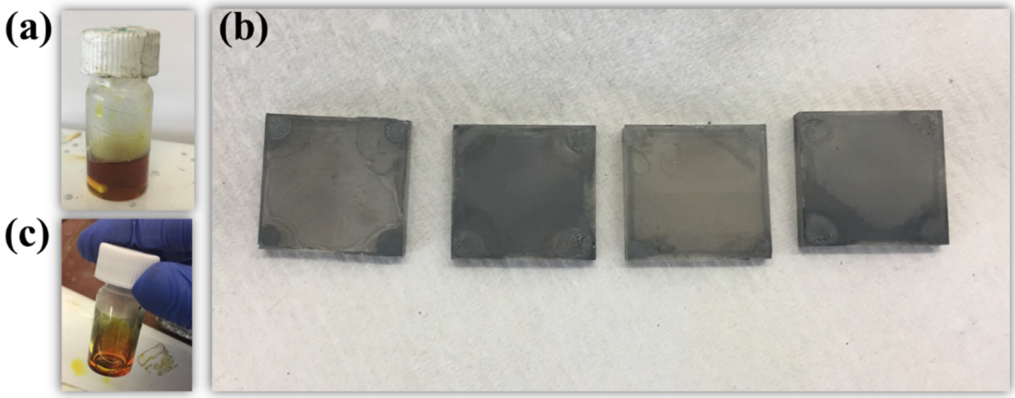

Figure S1. (**a**) Precursor solution of $AgBiS_2$ with en: $edtH_2$ (volume ratio of 10:1) in air. (**b**) $AgBiS_2$ thin-films deposited in air at different deposition speed (increasing speed from left to right). (**c**) Precursor solution of $AgBiS_2$ in air with a humidity of 65%.

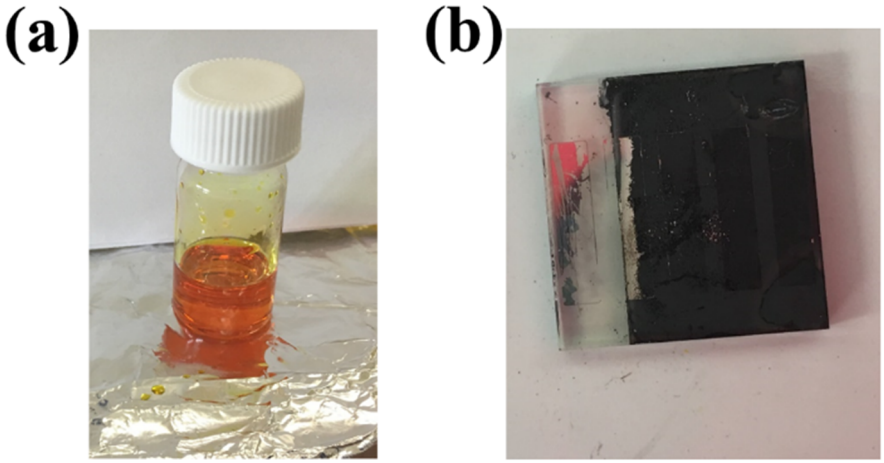

Figure S2. (**a**) Precursor solution of $AgBiS_2$ with en: $edtH_2$ (volume ratio of 10:1), and (**b**) $AgBiS_2$ thin-films deposited in N_2 atmosphere.

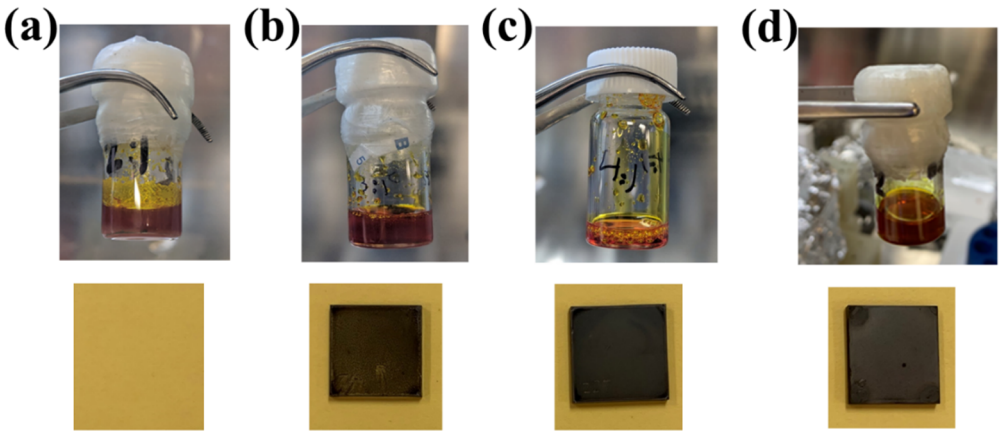

Figure S3. Precursor solution of $AgBiS_2$ with different en: $edtH_2$ volume ratio of (**a**) 2:1, (**b**) 3:1, (**c**) 4:1, (**d**) 5:1, and the corresponding deposited $AgBiS_2$ thin-films (bottom side).

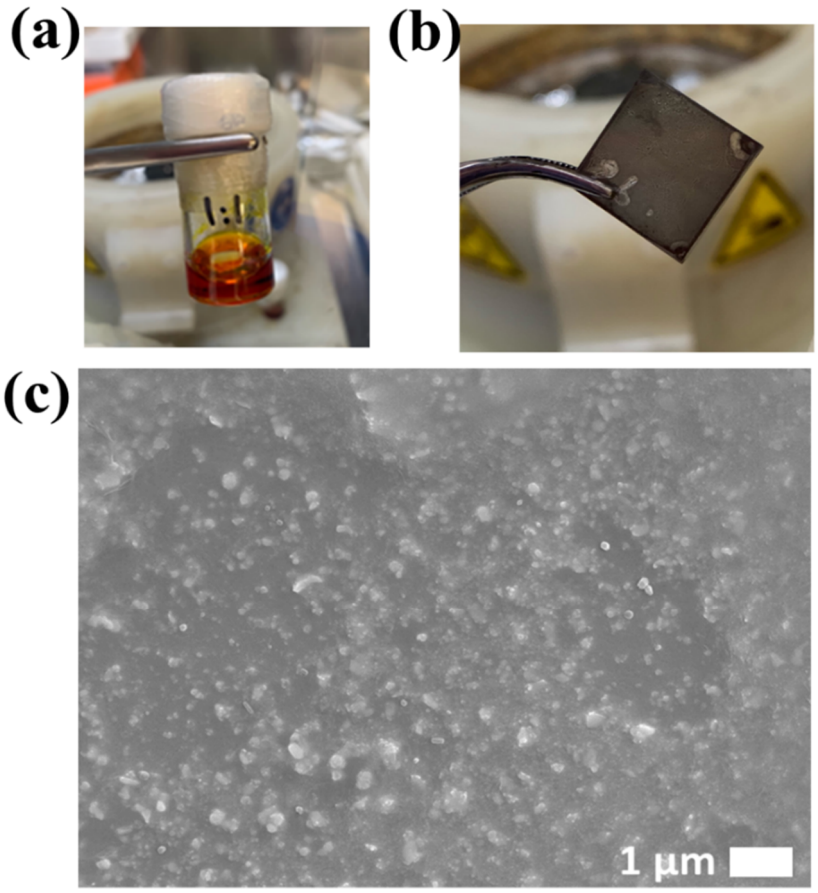

Figure S4. (**a**) Precursor solution of $AgBiS_2$ with adding extra sulfur powder, (**b**) Resultant $AgBiS_2$ thin-film from the solution with extra sulfur powder, (**c**) SEM image of the $AgBiS_2$ thin-film with extra sulfur powder.

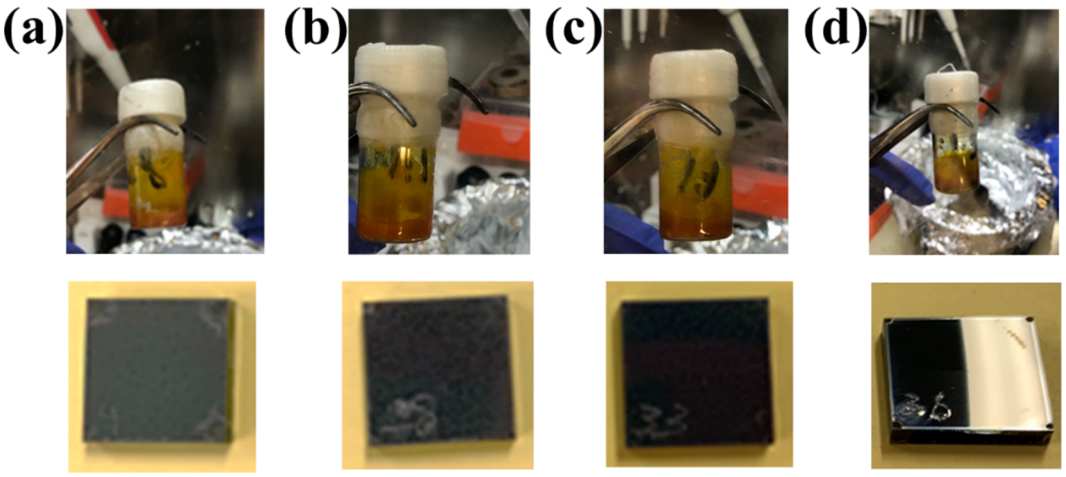

Figure S5. Precursor solutions (upper side) and deposited $AgBiS_2$ thin-films (downer side) with different Ag_2S: Bi_2S_3 ratios of (**a**) 1:0.8, (**b**) 1:1, (**c**) 1:1.2, (**d**) 1:1.5.

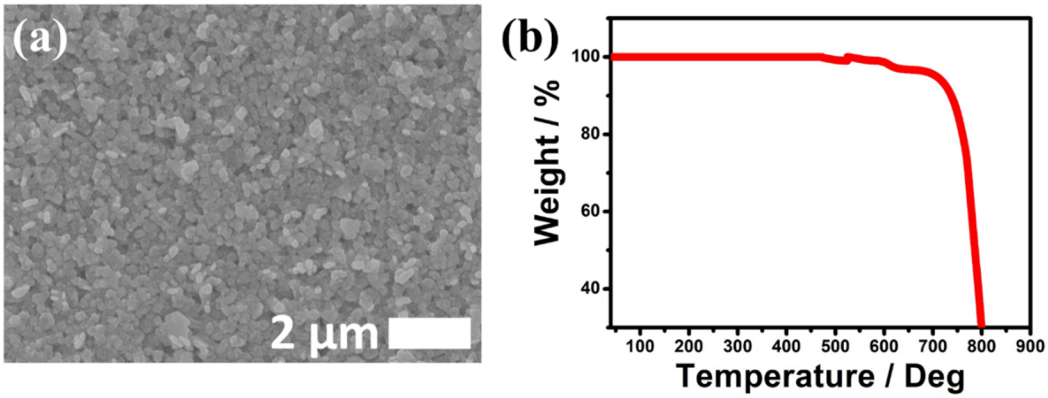

Figure S6. (**a**) SEM image of $AgBiS_2$ thin-film with Ag_2S: Bi_2S_3 molar ratio of 1:1.5 annealed at 180 °C. (**b**) TGA curves of $AgBiS_2$ in a nitrogen atmosphere.

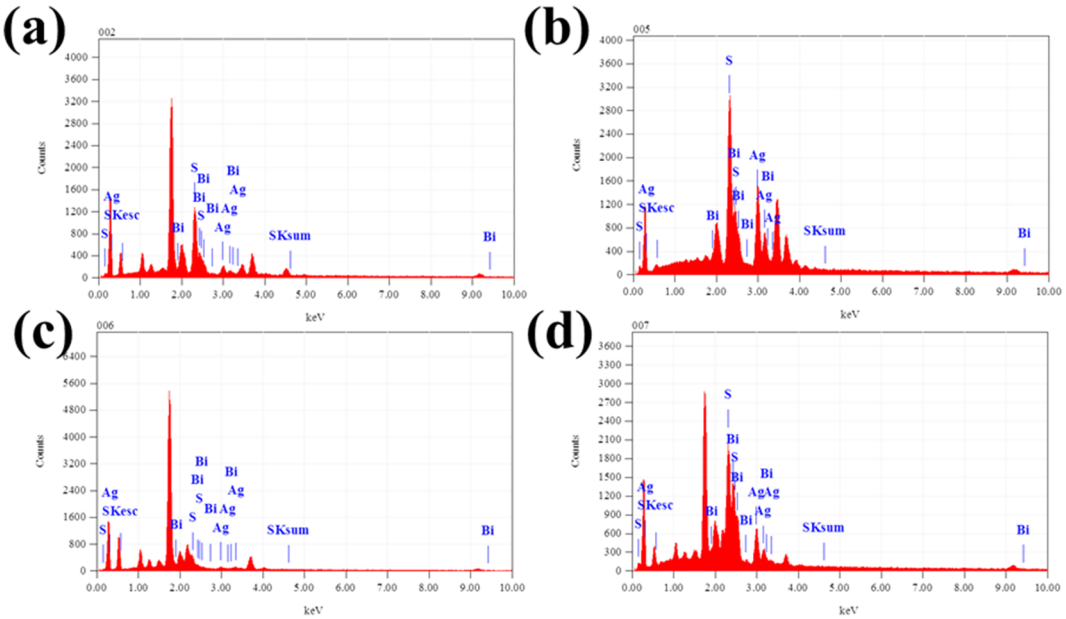

Figure S7. EDS spectrum of the $AgBiS_2$ thin-films with different Ag_2S: Bi_2S_3 molar ratio of (**a**) 1:0.8, (**b**) 1:1, (**c**) 1:1.2, (**d**) 1:1.5 annealed at 180 °C.

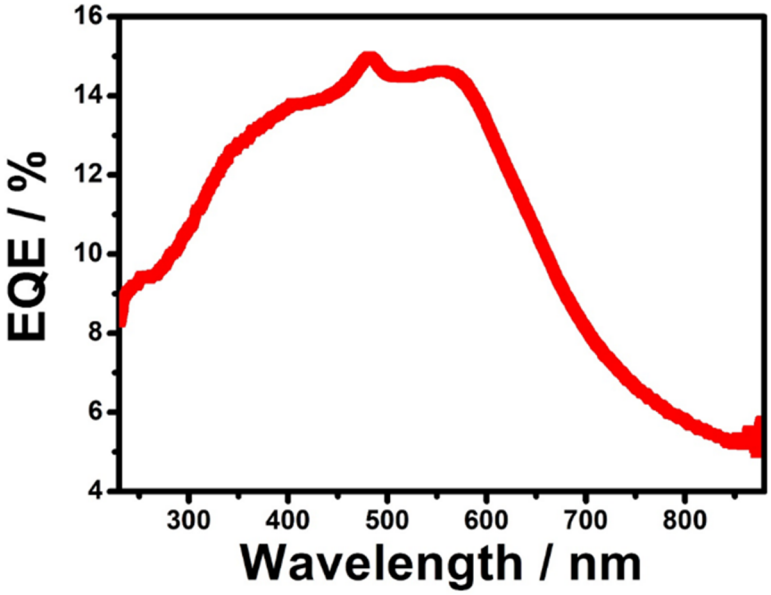

Figure S8. EQE result for the device with FTO/c-TiO_2/$AgBiS_2$/P3HT/Au structure.