

SUPPORTING INFORMATION

**Improvement of electrodeposited Sb₂Se₃ thin film photoelectroactivity
by cobalt grain boundary modification**

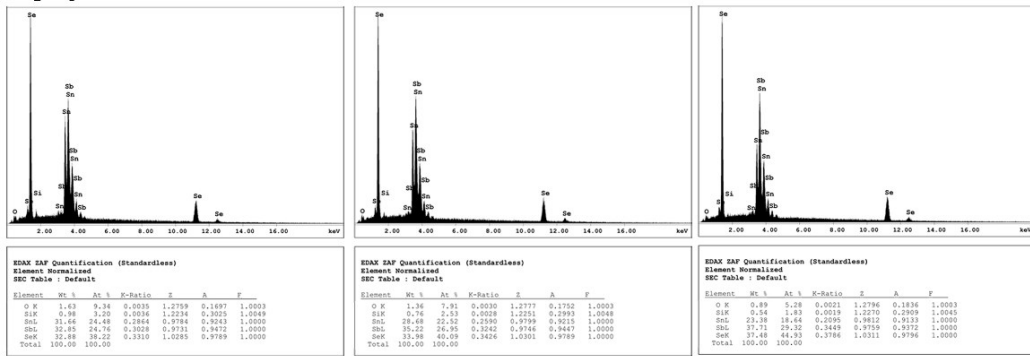
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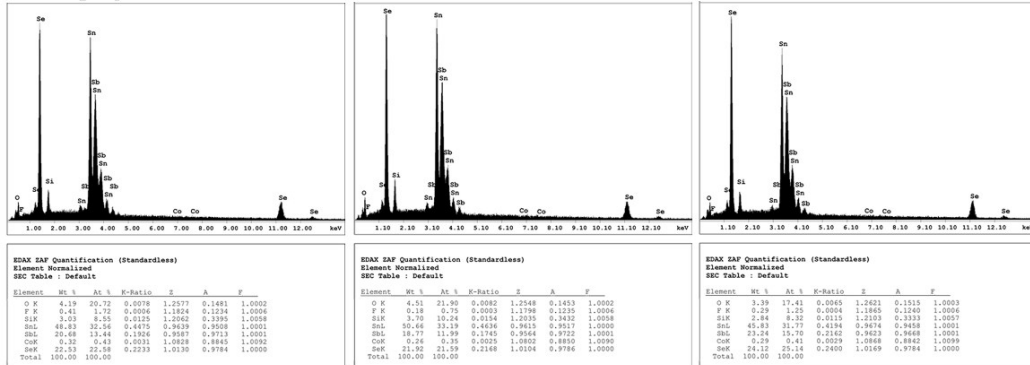
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States.

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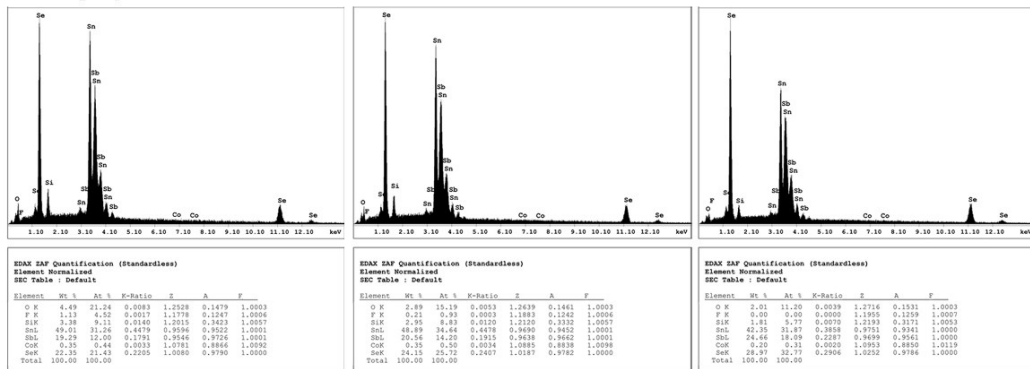
Sb₂Se₃



Co₂Sb₂Se₃ 1:20



Co₂Sb₂Se₃ 1:5



Co₂Sb₂Se₃ 1:2

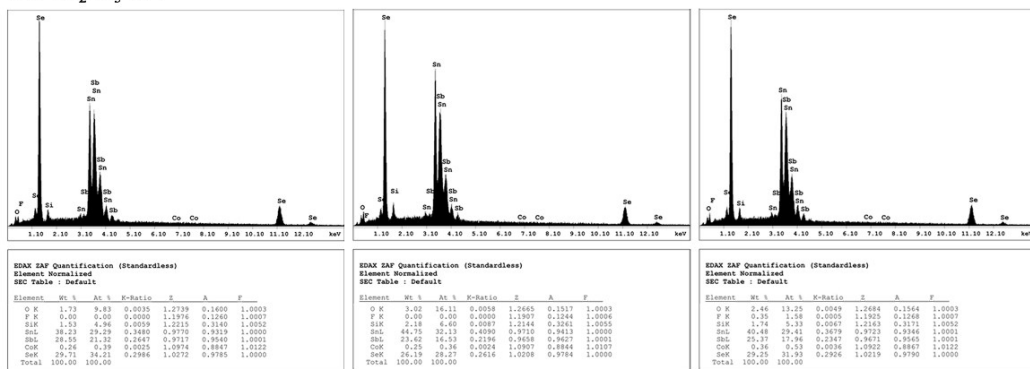
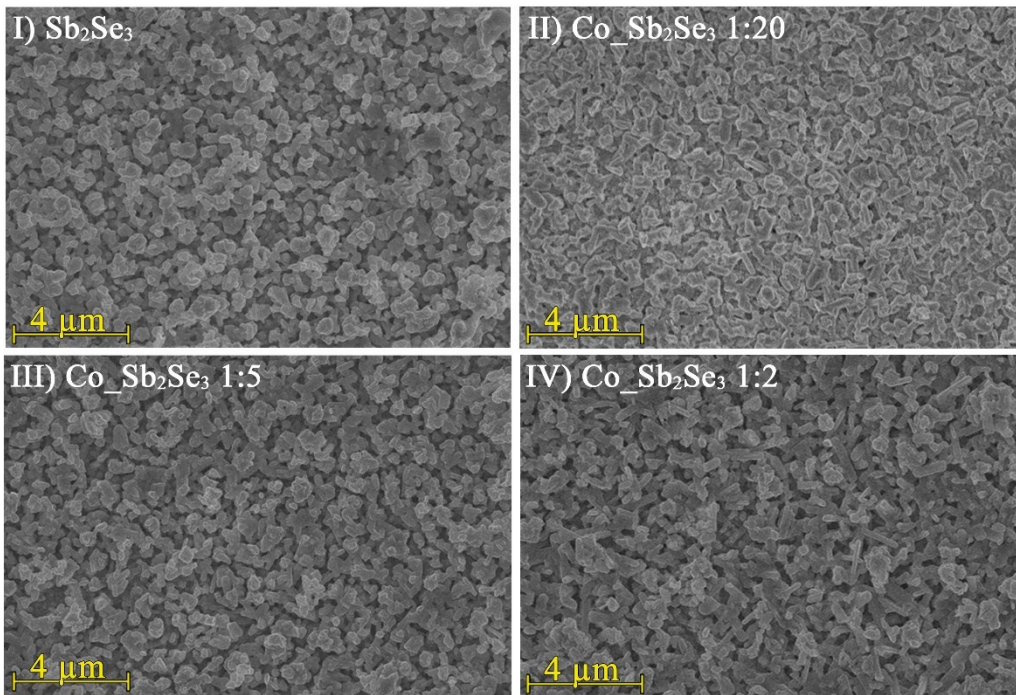


Fig. S1 EDS quantification plots for three distinct areas with 10k magnification of the unmodified and Co₂Sb₂Se₃ film's surfaces. The peaks indexed with Sn and O refer to the substrate.

a)



b)

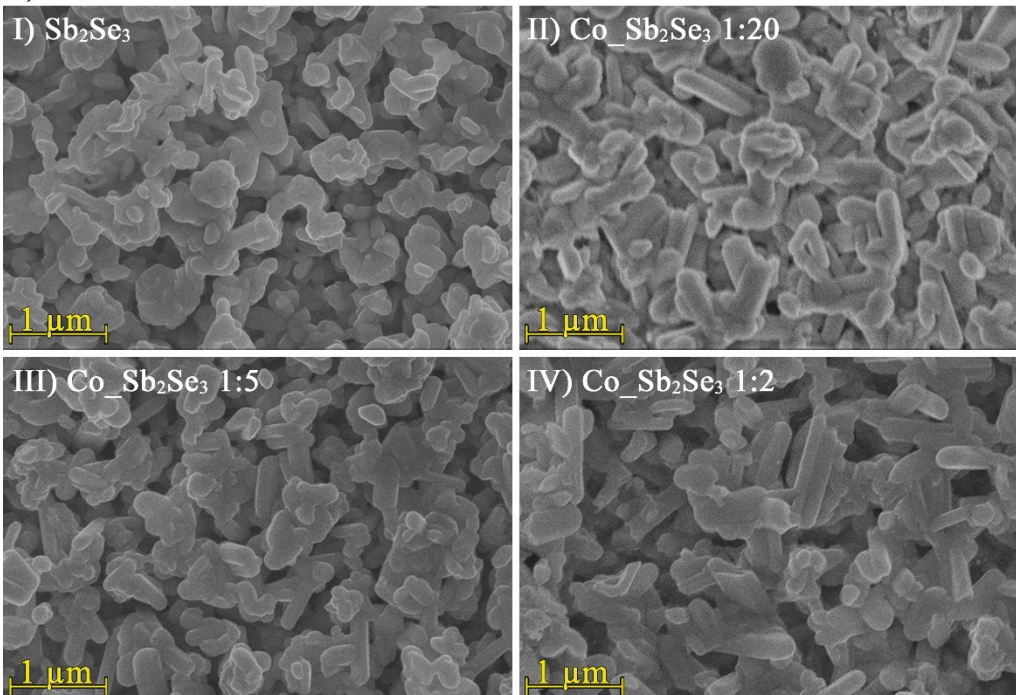


Fig. S2 Micrographs obtained by SEM of the film's surface with a) 15k and b) 50k magnification: I) the unmodified film, and $\text{Co_Sb}_2\text{Se}_3$ films obtained from the electrolytic bath with Co:Sb ratio of II) 1:20, III) 1:5, and IV) 1:2.

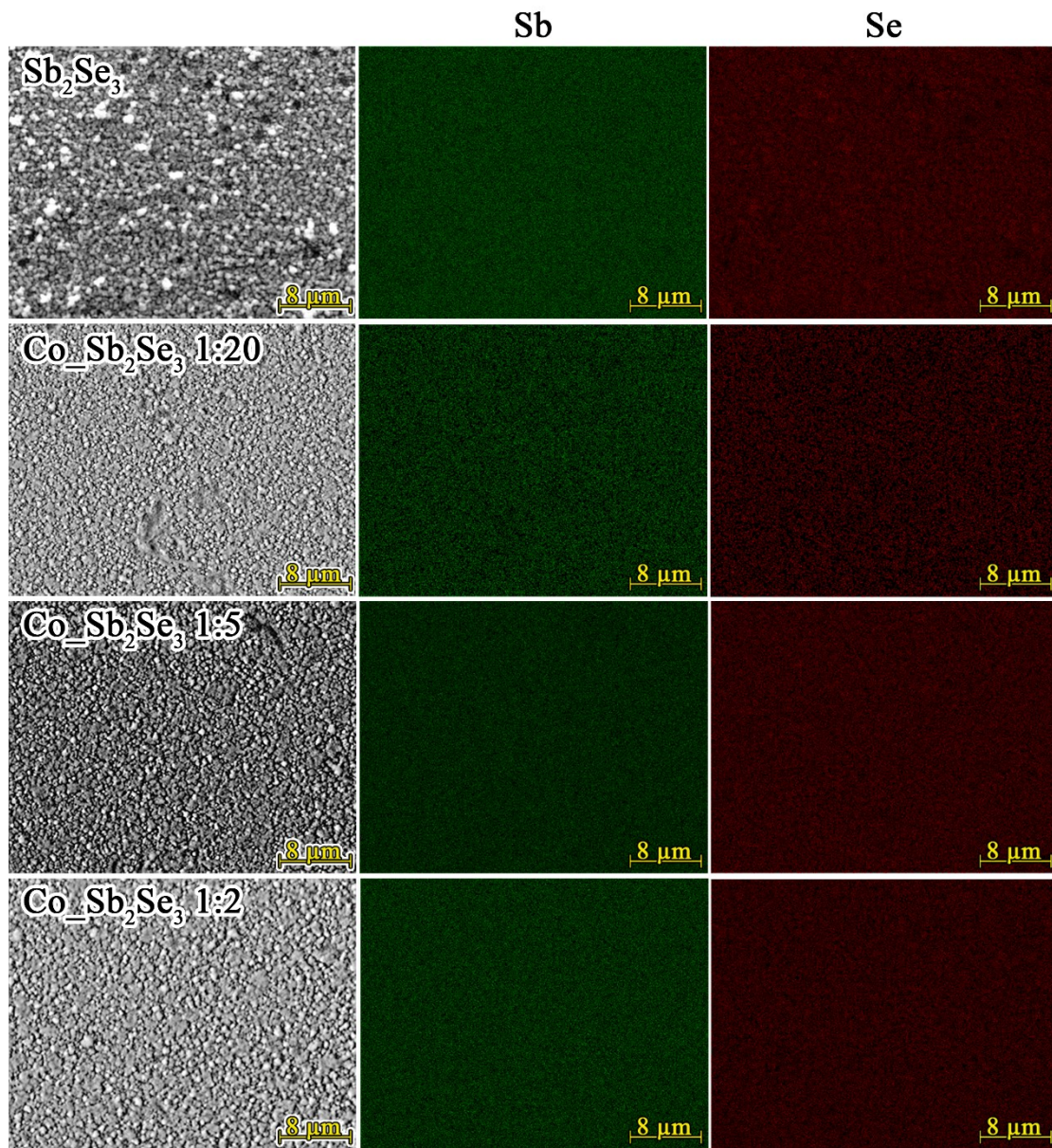


Fig. S3 Elemental mapping of Sb, Se, and Co with 5k magnification for the unmodified and $\text{Co}_x\text{Sb}_2\text{Se}_3$ films.

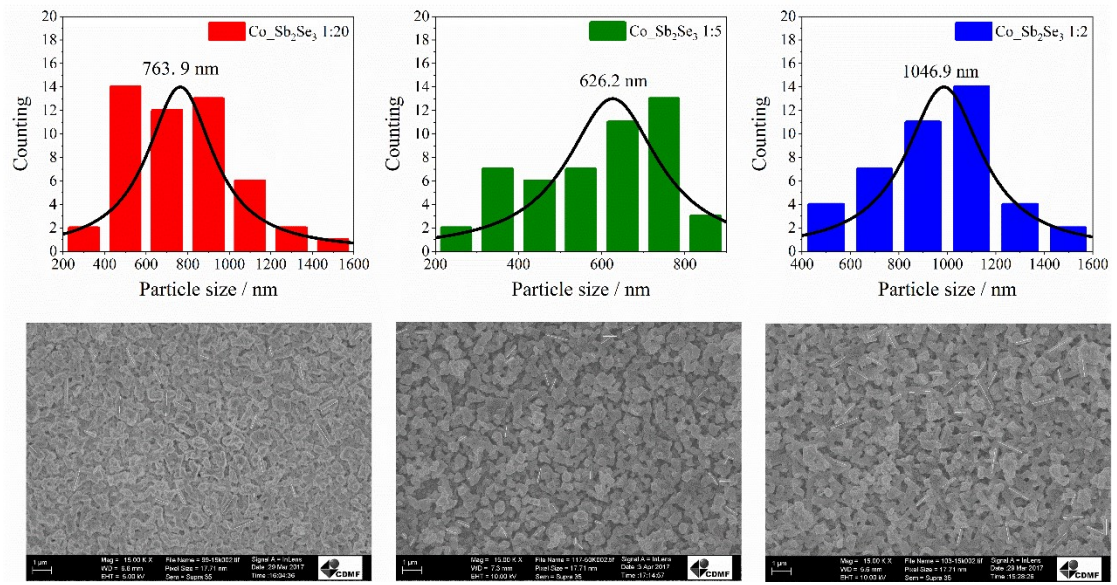


Fig. S4 Particle size for Co₂Sb₂Se₃ 1:20, 1:5 and 1:2 films and their respective micrographs obtained by SEM with 15k magnification.

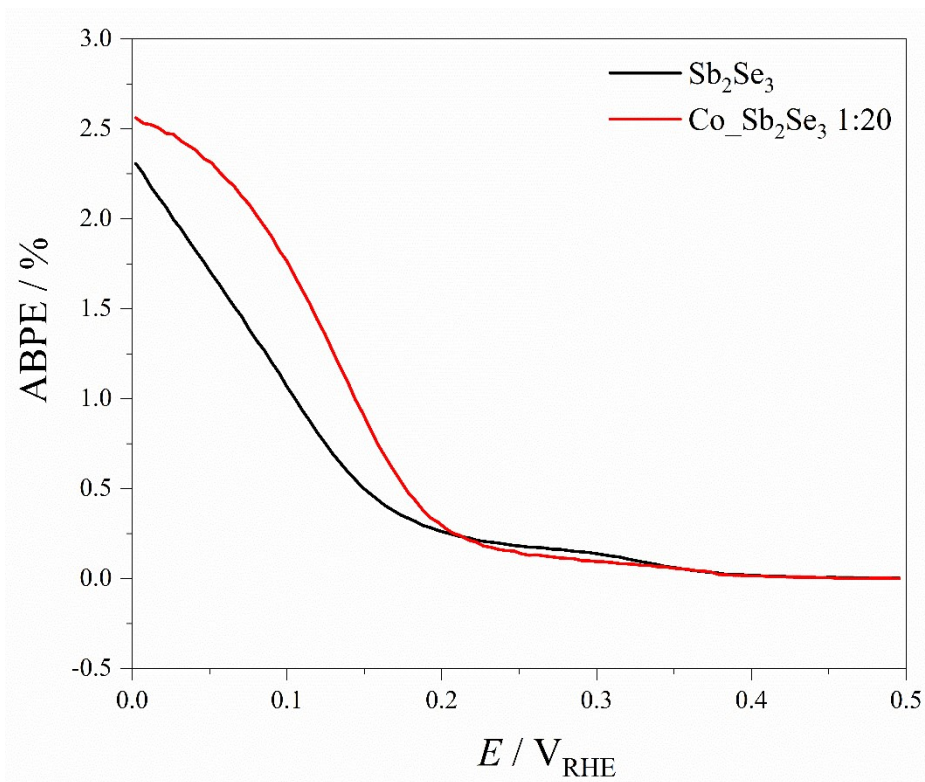


Fig. S5 ABPE plot for Sb_2Se_3 and $Co_Sb_2Se_3$ 1:20 films considering 100 mW cm^{-2} and faradaic efficiency equal to 100 %.

Table 1. Peak position and area of Sb 3d and O 1s atoms for Co_Sb2Se3 1:20 and unmodified films before and after PEC analyses obtained from the XPS spectrum.

Co_Sb2Se3 1:20 before					
	Sb 3d _{5/2} (Sb ₂ Se ₃)	Sb 3d _{3/2} (Sb ₂ Se ₃)	Sb 3d _{5/2} (Sb ₂ O ₃)	Sb 3d _{3/2} (Sb ₂ O ₃)	O 1s
Peak position	529.3	538.6	529.9	539.3	531.7
Area	75441.6	50294.4	103576.0	69050.6	13549.3
Co_Sb2Se3 1:20 after					
	Sb 3d _{5/2} (Sb ₂ Se ₃)	Sb 3d _{3/2} (Sb ₂ Se ₃)	Sb 3d _{5/2} (Sb ₂ O ₃)	Sb 3d _{3/2} (Sb ₂ O ₃)	O 1s
Peak position	528.8	238.2	529.6	539.0	531.3
Area	86714.1	57809.4	87458.6	58305.7	22726.4
Unmodified before					
	Sb 3d _{5/2} (Sb ₂ Se ₃)	Sb 3d _{3/2} (Sb ₂ Se ₃)	Sb 3d _{5/2} (Sb ₂ O ₃)	Sb 3d _{3/2} (Sb ₂ O ₃)	O 1s
Peak position	529.1	538.5	529.7	539.1	531.5
Area	77762.7	51841.8	103738.5	69159.0	12257.9
Unmodified after					
	Sb 3d _{5/2} (Sb ₂ Se ₃)	Sb 3d _{3/2} (Sb ₂ Se ₃)	Sb 3d _{5/2} (Sb ₂ O ₃)	Sb 3d _{3/2} (Sb ₂ O ₃)	O 1s
Peak position	529.1	538.5	529.8	539.1	531.7
Area	82701.9	55134.6	91775.7	61183.8	15262.0