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Supporting Information

Unusually High Seebeck coefficient arisen from the temperature-dependent carrier concentration in PbSe-$AgSbSe_2$ alloys

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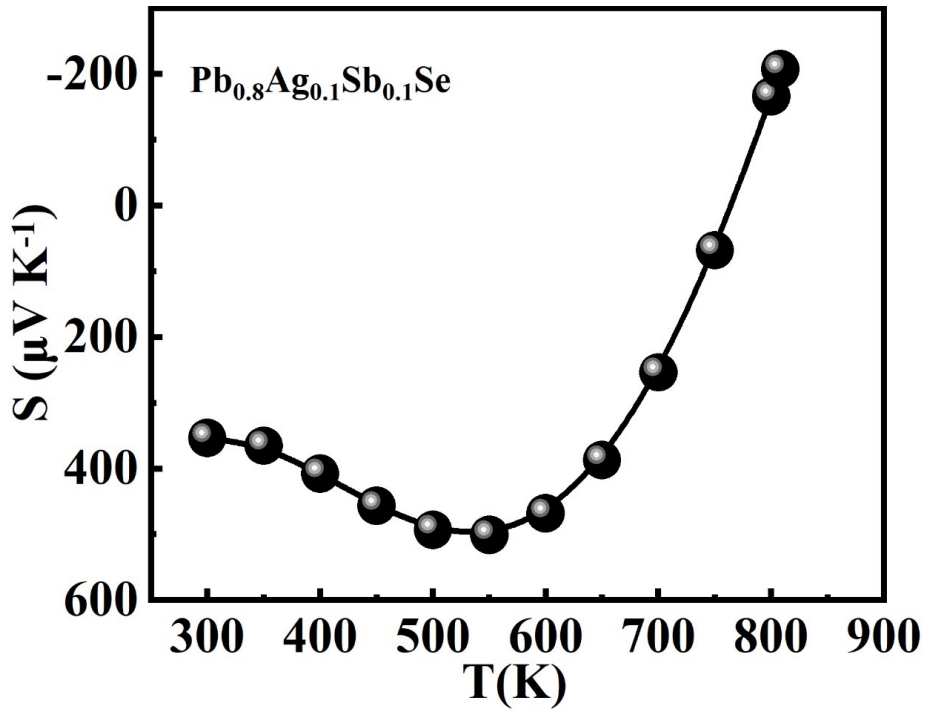


Figure S1. The Seebeck coefficient of $x = 0$ for $Pb_{0.8-x/3}Ag_{0.1}Sb_{0.1+x/3}Se_{1-x}Cl_x$

Lake Shore CRYOTRONICS 8400 Series

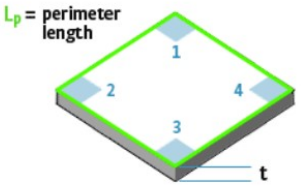
Hall measurement

Run-time operator

573 K

Sample

ID:	
Type:	van der Pauw
Thickness	
t [mm]:	1
Other dimensions	
Lp [mm]:	
Hall factor:	1
Max voltage [V]:	20
Max current [mA]:	50
Gate bias voltage [V]:	0



Comment:

Final results

		Mean value	Limit
μ_H	Hall mobility [m²/V·s]	3.92E-3	
	Carrier type	N	100%
n	Carrier concentration [1/m³]	9.13E24	
n_{sheet}	Sheet carrier concentration [1/m²]	9.13E21	
R_H	Hall coefficient [m³/C]	6.84E-7	
R_{Hsheet}	Sheet Hall coefficient [m²/C]	6.84E-4	
ρ	Resistivity [Ω·m]	1.75E-4	
ρ_{sheet}	Sheet resistivity [Ω/□]	1.75E-1	
V_H	Hall voltage [V]	-3.0422E-5	
	Phase [deg.]		
	Worst case Ohmic check correlation (2-4)	9.9960E-1	

Measurement comment

Lake Shore CRYOTRONICS 8400 Series

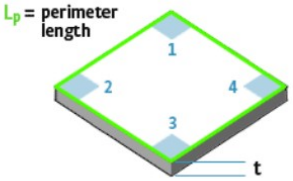
Hall measurement

Run-time operator

673 K

Sample

ID:	
Type:	van der Pauw
Thickness	
t [mm]:	1
Other dimensions	
Lp [mm]:	
Hall factor:	1
Max voltage [V]:	20
Max current [mA]:	50
Gate bias voltage [V]:	0



Comment:

Final results

		Mean value	Limit
μ_H	Hall mobility [m²/V·s]	2.82E-3	
	Carrier type	N	100%
n	Carrier concentration [1/m³]	1.85E25	
n_{sheet}	Sheet carrier concentration [1/m²]	1.85E22	
R_H	Hall coefficient [m³/C]	3.38E-7	
R_{Hsheet}	Sheet Hall coefficient [m²/C]	3.38E-4	
ρ	Resistivity [Ω·m]	1.20E-4	
ρ_{sheet}	Sheet resistivity [Ω/□]	1.20E-1	
V_H	Hall voltage [V]	-1.5039E-5	
	Phase [deg.]		
	Worst case Ohmic check correlation (1-3)	1.0000E0	

Measurement comment

Lake Shore CRYOTRONICS 8400 Series

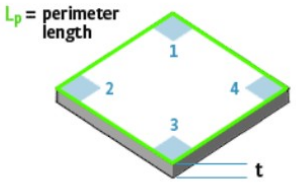
Hall measurement

Run-time operator

Sample

833 K

ID:	
Type:	van der Pauw
Thickness	
t [mm]:	1
Other dimensions	
Lp [mm]:	
Hall factor:	1
Max voltage [V]:	20
Max current [mA]:	50
Gate bias voltage [V]:	0



Comment:

Final results

		Mean value	Limit
μ_H	Hall mobility [m²/V·s]	1.51E-3	
	Carrier type	N	100%
n	Carrier concentration [1/m³]	3.91E25	
n_{sheet}	Sheet carrier concentration [1/m²]	3.91E22	
R_H	Hall coefficient [m³/C]	1.60E-7	
R_{Hsheet}	Sheet Hall coefficient [m²/C]	1.60E-4	
ρ	Resistivity [Ω·m]	1.06E-4	
ρ_{sheet}	Sheet resistivity [Ω/□]	1.06E-1	
V_H	Hall voltage [V]	-7.1025E-6	
	Phase [deg.]		
	Worst case Ohmic check correlation (2-4)	1.0000E0	

Measurement comment

Figure S2. Original Hall measurement data of $Pb_{0.794}Ag_{0.1}Sb_{0.106}Se_{0.982}Cl_{0.018}$ (x = 0.018) sample at 573 K, 673 K, 833 K.

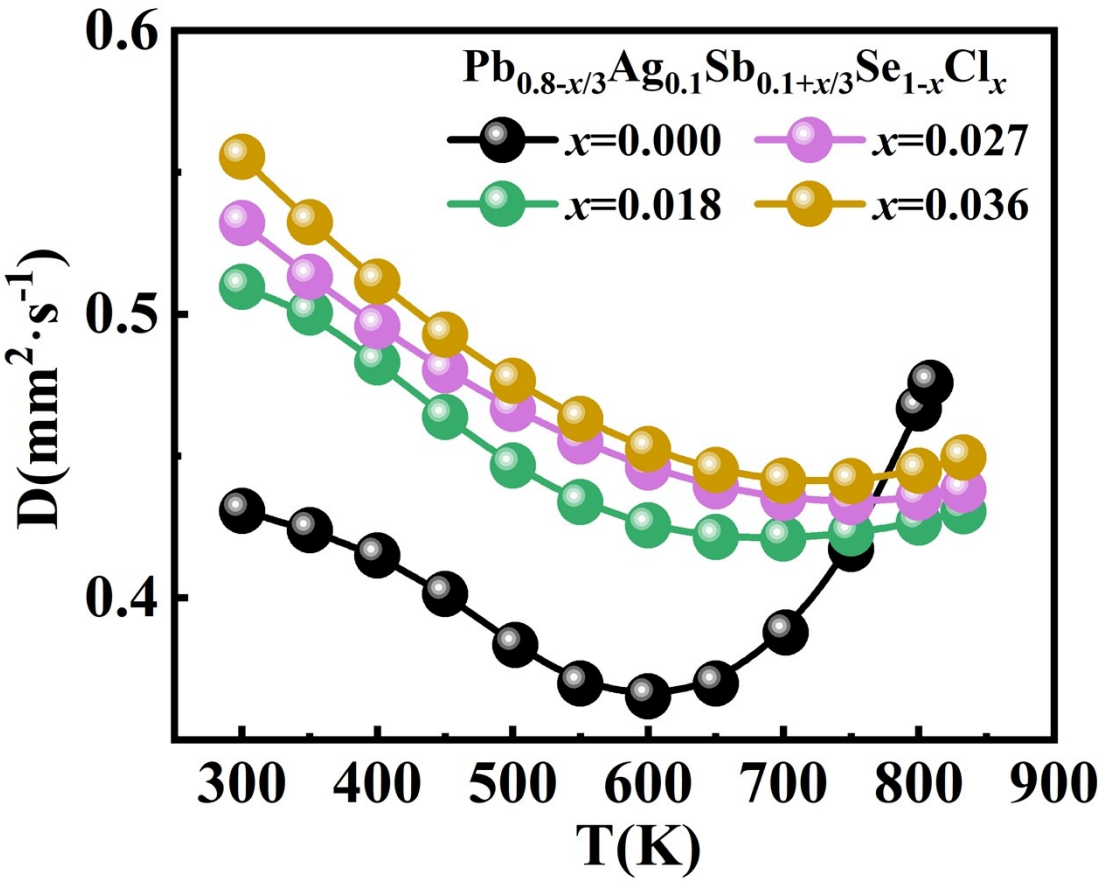


Figure S3. The thermal diffusivity D of $Pb_{0.8-x/3}Ag_{0.1}Sb_{0.1+x/3}Se_{1-x}Cl_x$ (x = 0, 0.018, 0.027, 0.036).

x	ρ (g cm^{-1})
x = 0.000	7.850
x = 0.018	7.622
x = 0.027	7.579
x = 0.036	7.754

Table S1. The density ρ of $Pb_{0.8-x/3}Ag_{0.1}Sb_{0.1+x/3}Se_{1-x}Cl_x$ (x = 0, 0.018, 0.027, 0.036) samples.