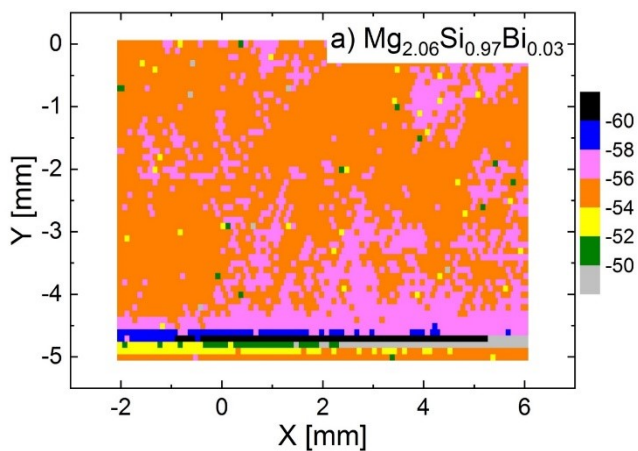
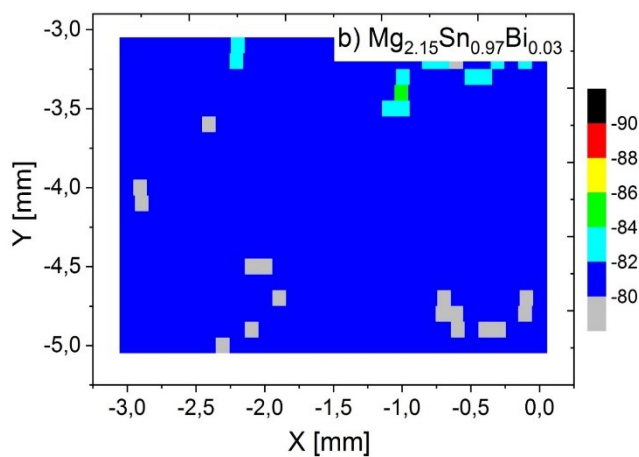


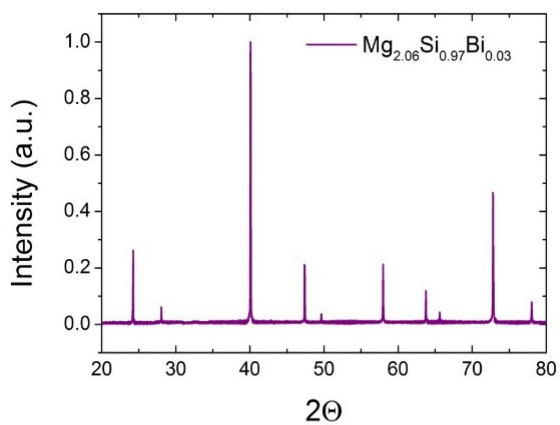
Supplementary Information



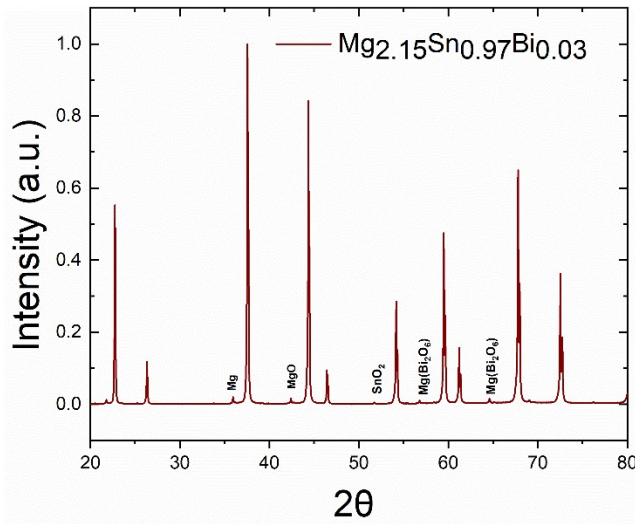
S1: Surface Seebeck scan of $n\text{-Mg}_2\text{Si}$



S2: Surface Seebeck scan of $n\text{-Mg}_2\text{Sn}$

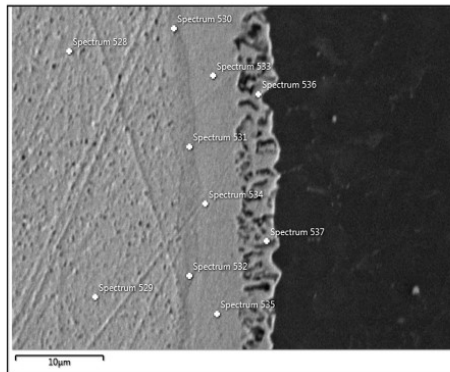


S3: X-ray diffraction on a sintered pellet of $n\text{-Mg}_2\text{Si}$



S4: X-ray diffraction on a sintered pellet of $n\text{-Mg}_2\text{Sn}$

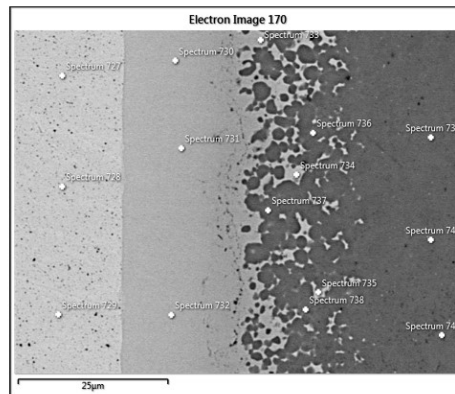
$\text{Mg}_{2.06}\text{Si}_{0.97}\text{Bi}_{0.03}/\text{Ag}$ at 500 °C



Spectrum Label (At%)	528	529	530	531	532	533	534	535	536	537
Mg	0.00	0.00	21.84	23.70	22.97	37.38	35.71	35.97	30.49	25.90
Si	0.00	0.03	1.08	0.96	1.02	1.32	0.57	1.33	22.12	31.98
Ag	100.00	99.97	77.08	75.33	76.01	61.30	63.72	62.70	47.39	42.12
Suggested phase	Ag		FCC (Ag) terminal solution			β- MgAg		AgMg + Si islands		

S5: A spectrum-wise point analysis of $n\text{-Mg}_2\text{Si}/\text{Ag}$ at 500 °C. The columns 530-532, and the columns 533-535 are the corresponding results for the approximated numbers of L1 and L2 from Table 2, respectively. However, L3 in Table 2 is tailored as an average of spectrum 536 and 537. All the compositions are carefully normalized by avoiding C signals that was a result of preparation of samples.

$\text{Mg}_{2.06}\text{Sn}_{0.97}\text{Bi}_{0.03}/\text{Ag}$ at 450 °C



Spectrum Label (At%)	727	728	729	730	731	732	733	735	736	737	738	739	740	741
Mg	0.49	0.22	0.60	30.66	31.50	31.68	40.05	42.94	65.81	66.02	65.61	65.68	65.56	65.44
Ag	99.51	99.78	99.40	61.67	61.06	60.74	46.29	35.14	1.23	0.92	1.24	0.87	0.99	0.90
Sn	0.00	0.00	0.00	7.67	7.44	7.58	13.66	21.92	32.96	33.06	33.15	33.45	33.45	33.66
Suggested phase	Ag			Wide composition MgAg (50 < Ag < 65 at%) dissolving Sn				MgAg dissolving Sn	Mg ₂ Sn dissolving Ag					

S6: A spectrum-wise point analysis of n-Mg₂Sn/Ag at 450 °C. All the compositions are carefully normalized by avoiding C signals that was a result of preparation of samples.