Supplementary material

Efficient way of increasing total entropy of mixing in high-entropy-alloy compounds: a case of NaCl-type (Ag,In,Pb,Bi)$Te_{1-x}Se_x$ (x = 0.0, 0.25, 0.5) superconductors

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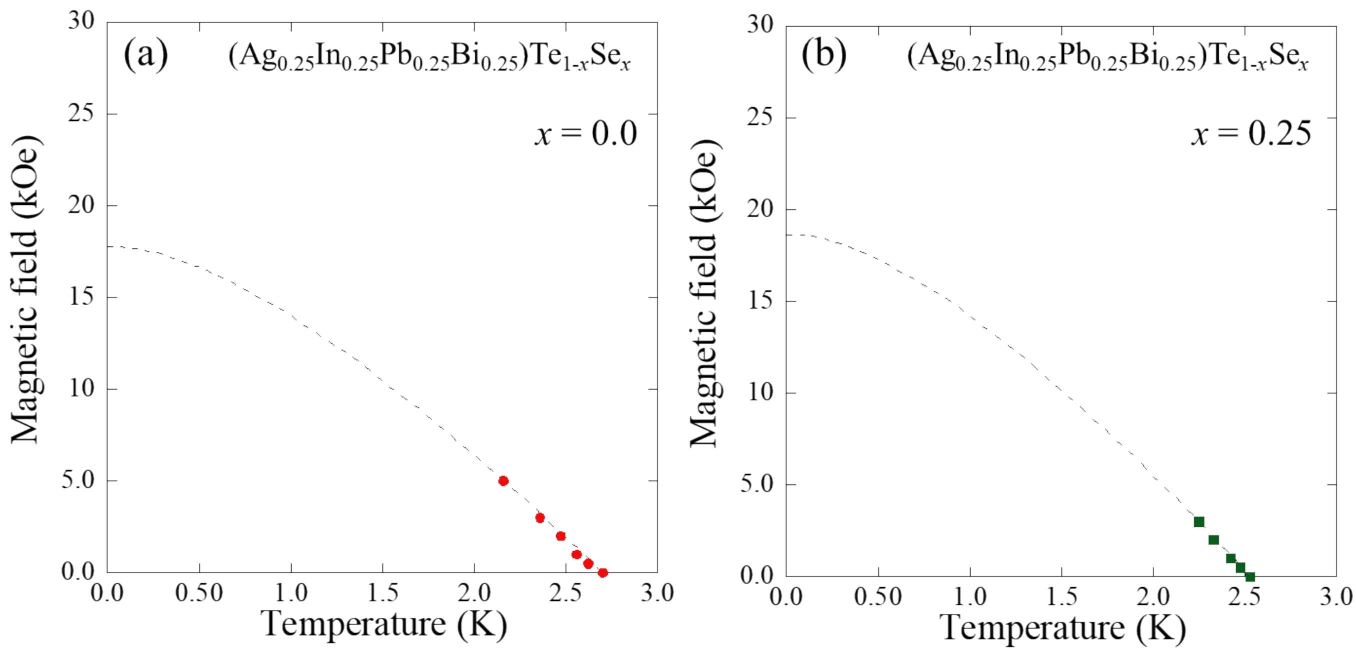

Fig. S1. Temperature dependence of H_{c2} for (a) x = 0 and (b) x = 0.25 where T_c^{onset} was estimated as the temperature where the resistivity becomes 90% of normal state resistivity at 3.0 K. The dashed lines are the WHH fitting results.

Table S1. Chemical composition, $\Delta S_{mix}/R$ (Site 1), $\Delta S_{mix}/R$ (Site 2), $\Delta S_{mix}/R$ (Total), transition temperature (T_c^{onset}), H_{c2} (0), lattice constant *a* (Å), lattice constant *c* (Å), and type of the structure of the high-entropy-alloy and/or medium-entropy-alloy superconductors.

HEA superconductor	$\Delta S_{mix}/R$ (site1)	$\Delta S_{mix}/R$ (site2)	$\Delta S_{mix}/R$ (Total)	T_c (K)	$H_{c2}(0)$ (kOe)	Lattice *a* (Å)	Lattice *c* (Å)	Structure	Reference
$(Ag_{0.24}In_{0.22}Pb_{0.27}Bi_{0.26})Te_{1.02}$	1.37	0.00	1.37	2.7	18	6.237	-	*Fm*-3*m*	This work
$(Ag_{0.29}In_{0.26}Pb_{0.22}Bi_{0.24})Te_{0.78}Se_{0.20}$	1.38	0.51	1.89	2.5	19	6.176	-	*Fm*-3*m*	
$(Ag_{0.34}In_{0.15}Pb_{0.24}Bi_{0.29})Te_{0.65}Se_{0.34}$	1.35	0.65	2.00	2.0	-	6.121	-	*Fm*-3*m*	
$Ag_{0.20}Cd_{0.20}Sn_{0.20}Sb_{0.15}Pb_{0.20}Te_{1.05}$	1.60	0.00	1.60	1.2	-	6.186	-	*Fm*-3*m*	Md. R. Kasem et al., Appl. Phys. Express **13**, 033001 (2020)
$Ag_{0.24}In_{0.22}Sn_{0.18}Sb_{0.14}Pb_{0.19}Te_{1.03}$	1.59	0.00	1.59	1.4	-	6.202	-	*Fm*-3*m*	
$Ag_{0.22}Cd_{0.22}In_{0.23}Sn_{0.17}Sb_{0.14}Te_{1.02}$	1.59	0.00	1.59	0.7	-	6.098	-	*Fm*-3*m*	
$Ag_{0.19}Cd_{0.19}Sn_{0.20}Pb_{0.18}Bi_{0.21}Te_{1.03}$	1.61	0.00	1.61	1.0	-	6.244	-	*Fm*-3*m*	
$Ag_{0.21}Cd_{0.19}In_{0.25}Pb_{0.16}Bi_{0.18}Te_{1.00}$	1.60	0.00	1.60	1.0	-	6.189	-	*Fm*-3*m*	
$Ag_{0.21}Cd_{0.21}In_{0.24}Sn_{0.19}Bi_{0.19}Te_{0.97}$	1.61	0.00	1.61	1.0	-	6.136	-	*Fm*-3*m*	
$Ag_{0.20}In_{0.20}Sn_{0.22}Pb_{0.19}Bi_{0.20}Te_{0.98}$	1.61	0.00	1.61	2.8	19	6.255	-	*Fm*-3*m*	Y. Mizuguchi, J. Phys. Soc. Jpn. **88**, 124708 (2019)
$(TaNb)_{0.67}(HfZrTi)_{0.33}$	1.46	-	1.46	7.7	80	3.340	-	bcc	J. Guo et al., Proc. Natl. Acad. Sci. USA **114**, 13144 (2017)
$(TaNb)_{0.7}(ZrHfTi)_{0.3}$	1.43	-	1.43	8.0	67	3.29~3.33	-	bcc	F. O. von Rohr et al., Phys. Rev. Mater. **2**, 034801 (2018)
$(TaNb)_{0.7}(ZrHfTi)_{0.33}$	1.24	-	1.24	7.8	78	3.29~3.33	-	bcc	
$(TaNb)_{0.7}(ZrHfTi)_{0.4}$	1.31	-	1.31	7.6	84	3.29~3.33	-	bcc	
$(TaNb)_{0.7}(ZrHfTi)_{0.5}$	1.39	-	1.39	6.5	117	3.29~3.33	-	bcc	
$(TaNb)_{0.7}(ZrHfTi)_{0.84}$	1.60	-	1.60	4.5	90	3.29~3.33	-	bcc	
$(TaNb)_{0.67}(Hf)_{0.33}$	1.10	-	1.10	7.3	-	3.29~3.33	-	bcc	
$(TaNb)_{0.67}(HfZr)_{0.33}$	1.33	-	1.33	6.6	-	3.29~3.33	-	bcc	
$Nb_{0.67}(HfZrTi)_{0.33}$	1.00	-	1.00	9.2	-	3.29~3.33	-	bcc	
$(NbV)_{0.67}(HfZrTi)_{0.33}$	1.46	-	1.46	7.2	-	3.29~3.33	-	bcc	
$(TaV)_{0.67}(HfZrTi)_{0.33}$	1.46	-	1.46	4.0	-	3.29~3.33	-	bcc	
$(TaNb)_{0.67}(HfZrTi)_{0.33}$	1.46	-	1.46	7.3	-	3.29~3.33	-	bcc	
$(TaNbV)_{0.67}(HfZrTi)_{0.33}$	1.73	-	1.73	4.3	-	3.29~3.33	-	bcc	
$(ScZrNbTa)_{0.65}(RhPd)_{0.35}$	1.18	0.61	1.79	9.3	107	3.278	-	CsCl	K. Stolze et al., Chem. Mater. **30**, 906 (2018)
$(ScZrNb)_{0.63}(RhPd)_{0.37}$	1.16	0.62	1.79	7.5	96	3.278~3.29	-	CsCl	
$(ScZrNb)_{0.62}(RhPd)_{0.38}$	1.16	0.63	1.79	6.4	89	3.278~3.29	-	CsCl	
$(ScZrNb)_{0.60}(RhPd)_{0.40}$	1.14	0.64	1.78	3.9	21	3.278~3.29	-	CsCl	
$Ta_{0.34}Nb_{0.33}Hf_{0.08}Zr_{0.14}Ti_{0.11}$	1.45	-	1.45	7.3	82	3.360	-	bcc	P. Koželj et al., Phys. Rev. Lett. **113**, 107001 (2014), S. Marik et al., J. Alloys Compd. **695**, 3530 (2017)
$[Nb_{0.11}Re_{0.56}][HfZrTi]_{0.33}$	0.73	0.57	1.30	4.4	36	5.255	8.593	hcp	S. Marik et al., Phys. Rev. Mater. **3**, 060602 (2019)
$Hf_{0.21}Nb_{0.25}Ti_{0.15}V_{0.15}Zr_{0.24}$	1.59	-	1.59	5.3	-	3.401	-	bcc	N. Ishizu et al., Results in Phys. **13**, 102275 (2019)
$Ta_{0.35}Nb_{0.35}Zr_{0.15}Ti_{0.15}$	1.30	-	1.30	8.0	116	3.329	-	bcc	Y. Yuan et al., Front. Mater. **5**,72 (2018)
$(ZrNb)_{0.2}(MoReRu)_{0.8}$	1.52	-	1.52	4.2	-	9.701	-	bcc	K. Stolze et al., J. Mater. Chem. C **6**, 10441 (2018)
$(ZrNb)_{0.1}(MoReRu)_{0.9}$	1.38	-	1.38	5.3	79	9.613	-	bcc	
$(HfTaWIr)_{0.6}Re_{0.4}$	1.50	-	1.50	1.9	-	9.778	-	bcc+hcp	
$(HfTaWIr)_{0.5}Re_{0.5}$	1.39	-	1.39	2.7	-	9.741	-	bcc+hcp	
$(HfTaWIr)_{0.4}Re_{0.6}$	1.23	-	1.23	4.0	47	9.723	-	bcc	
$(HfTaWIr)_{0.3}Re_{0.7}$	1.03	-	1.03	4.5	-	9.662	-	bcc	
$(HfTaWIr)_{0.2}Re_{0.8}$	0.78	-	0.78	5.7	-	9.638	-	bcc	
$(HfTaWPt)_{0.5}Re_{0.5}$	1.39	-	1.39	2.2	-	9.726	-	bcc+hcp	
$(HfTaWPt)_{0.4}Re_{0.6}$	1.23	-	1.23	4.4	59	9.683	-	bcc	
$(HfTaWPt)_{0.3}Re_{0.7}$	1.03	-	1.03	5.7	-	9.648	-	bcc	
$(HfTaWPt)_{0.25}Re_{0.75}$	0.91	-	0.91	6.1	-	9.636	-	bcc	
$Nb_{26.1}Ta_{25.1}Ti_{23.4}Zr_{0.254}$	1.39	-	1.39	8.3	14	3.373	-	bcc	K. Y. Wu et al., Nat. Sci. J. **10**, 110 (2018)
$Nb_{0.198}Ta_{0.189}Ti_{0.208}Zr_{0.187}Hf_{0.218}$	1.61	-	1.61	7.1	20	3.405	-	bcc	
$Nb_{0.163}Ta_{0.157}Ti_{0.169}Zr_{0.171}Hf_{0.175}V_{0.165}$	1.79	-	1.79	5.1	20	3.357	-	bcc	
$Nb_{0.2}Ta_{0.2}Ti_{0.2}Zr_{0.2}Fe_{0.2}$	1.61	-	1.61	6.9	-	-	-	bcc	
$Nb_{0.2}Ta_{0.2}Ti_{0.2}Zr_{0.2}Ge_{0.2}$	1.61	-	1.61	8.4	13	-	-	bcc	
$Nb_{0.2}Ta_{0.2}Ti_{0.2}Zr_{0.2}Si_{0.2}V_{0.2}$	1.79	-	1.79	4.3	-	-	-	bcc	
$Nb_{0.2}Ta_{0.2}Ti_{0.2}Zr_{0.2}Si_{0.2}Ge_{0.2}$	1.79	-	1.79	7.4	9	-	-	bcc	
$(Y_{0.28}Nd_{0.16}Sm_{0.18}Eu_{0.18}Gd_{0.20})Ba_2Cu_3O_{7-d}$	1.59	0.00	1.59	93.0	-	3.845	-	*Pmmm*	Y. Shukunami et al.,, Physica C **572**, 1353623 (2020)
$(Y_{0.18}La_{0.24}Nd_{0.14}Sm_{0.14}Eu_{0.15}Gd_{0.15})Ba_2Cu_3O_{7-d}$	1.77	0.00	1.77	93.0	-	3.864	-	*Pmmm*	
$(La_{0.2}Ce_{0.2}Pr_{0.2}Nd_{0.2}Sm_{0.2})O_{0.5}F_{0.5}BiS_2$	1.61	0.69	2.30	4.3	-	4.020	13.417	*P*4/*nmm*	R. Sogabe et al., Appl. Phys. Express **11**, 053102 (2018), R. Sogabe et al., Solid State Commun. **295**, 43 (2019)
$(La_{0.3}Ce_{0.3}Pr_{0.2}Nd_{0.1}Sm_{0.1})O_{0.5}F_{0.5}BiS_2$	1.50	0.69	2.20	3.4	-	4.036	13.402	*P*4/*nmm*	R. Sogabe et al., Appl. Phys. Express **11**, 053102 (2018)
$(La_{0.1}Ce_{0.1}Pr_{0.3}Nd_{0.3}Sm_{0.2})O_{0.5}F_{0.5}BiS_2$	1.50	0.69	2.20	4.7	-	4.012	13.419	*P*4/*nmm*	
$(La_{0.1}Ce_{0.1}Pr_{0.2}Nd_{0.3}Sm_{0.3})O_{0.5}F_{0.5}BiS_2$	1.50	0.69	2.20	4.9	-	4.008	13.431	*P*4/*nmm*	