

Supplemental Information Table 1: Refined structural data for Yb₉Mn_{4.2}Sb₉, Yb₁₄MnSb₁₁ and YbMn₂Sb₂

Yb₉Mn_{4.2}Sb₉

Spacegroup: *Pbam* (no. 55)

a = 2189.00, *b* = 1237.19, *c* = 460.27 pm

atom	Wyckoff position	<i>x/a</i>	<i>y/b</i>	<i>z/c</i>
Yb1	2 <i>b</i>	0	0	1/2
Yb2	4 <i>g</i>	0.14045	0.13723	0
Yb3	4 <i>g</i>	0.08804	0.44332	0
Yb4	4 <i>g</i>	0.25367	0.38051	0
Yb5	4 <i>h</i>	0.39630	0.20765	1/2
Mn1	4 <i>h</i>	0.01736	0.28397	1/2
Mn2	4 <i>h</i>	0.24507	0.15867	1/2
Mn3 ¹⁾	4 <i>g</i>	0.40181	0.42704	0
Sb1	2 <i>d</i>	0	1/2	1/2
Sb2	4 <i>g</i>	0.48531	0.31781	0
Sb3	4 <i>g</i>	0.29822	0.13912	0
Sb4	4 <i>h</i>	0.35185	0.46397	1/2
Sb5	4 <i>h</i>	0.17752	0.32052	1/2

¹⁾ Mn3 has a site occupation factor of 0.05

Yb₁₄MnSb₁₁

Spacegroup: *I4₁/acd* (no. 142)

a = 1659.64, *c* = 2193.48 pm

YbMn₂Sb₂

Spacegroup: *P* $\bar{3}$ *m*1 (no. 142)

a = 451.93, *c* = 743.84 pm

Supplemental Information Table 2: EPMA analysis for Yb₉Mn_{4.2}Sb₉

EPMA analysis was conducted using Yb₂O₃, Mn metal and Sb metal standards.

Element	Nominal Ratio	Matrix Average (Mass %)	Nominal Ratio	Matrix Average (Atomic %)
Yb	54.0	52.6	40.5	39.3
Mn	8.0	8.8	18.9	20.5
Sb	37.9	37.9	40.5	39.3
Total	100.0	99.4	100.0	100.0