Supplementary Information for

"$AlPd_{15}B_7$: a new superconducting cage-compound with *anti*-$Yb_3Rh_4Sn_{13}$-type of structure"

*Qiang Zheng,[a] Walter Schnelle,[a] Yurii Prots,[a] Matej Bobnar,[a] Ulrich Burkhardt,[a] Andreas Leithe-Jasper[a] and Roman Gumeniuk,[*a,b]*

[a] Max-Planck-Institut für Chemische Physik fester Stoffe, Nöthnitzer Str. 40, 01187 Dresden, Germany

[b] Institut für Experimentelle Physik, TU Bergakademie Freiberg, Leipziger Str. 23, 09596 Freiberg, Germany

[*] E-mail address: roman.gumeniuk@physik.tu-freiberg.de

Table S1. Interatomic distances (Å) in the $AlPd_{15}B_7$ structure

Atoms		Distances	CN
Al	–6Pd2	2.730(1)	12
	–6Pd3	2.752(1)	
Pd1	–2B2	2.079(3)	14
	–2Pd3	2.774(1)	
	–2Pd2	2.782(1)	
	–2Pd2	2.857(1)	
	–2Pd2	2.976(1)	
	–2Pd3	3.012(1)	
	–2Pd3	3.214(1)	
Pd2	–1B3	2.139(6)	15
	–1B1	2.217(1)	
	–1B2	2.252(1)	
	–1Pd3	2.714(2)	
	–1Al	2.730(1)	
	–1Pd1	2.782(1)	
	–1Pd2	2.850(2)	
	–1Pd1	2.857(1)	
	–1Pd2	2.885(2)	
	–1Pd3	2.885(2)	
	–2Pd2	2.942(2)	
	–1Pd3	2.955(2)	
	–1Pd1	2.976(1)	
	–1Pd2	3.391(1)	
Pd3	–1B2	2.156(2)	14
	–1B3	2.157(5)	
	–1B3	2.28(2)	
	–1Pd2	2.714(2)	
	–1Al	2.752(1)	
	–1Pd1	2.774(2)	
	–2Pd3	2.789(2)	
	–1Pd2	2.885(1)	
	–2Pd3	2.921(2)	
	–1Pd2	2.955(2)	
	–1Pd1	3.012(1)	
	–1Pd1	3.214(1)	

B1	–6Pd2	2.217(1)	6
B2	–2Pd1	2.079(3)	6
	–2Pd3	2.156(2)	
	–2Pd2	2.252(1)	
B3	–2Pd2	2.139(6)	6
	–2Pd3	2.157(5)	
	–2Pd3	2.28(2)	

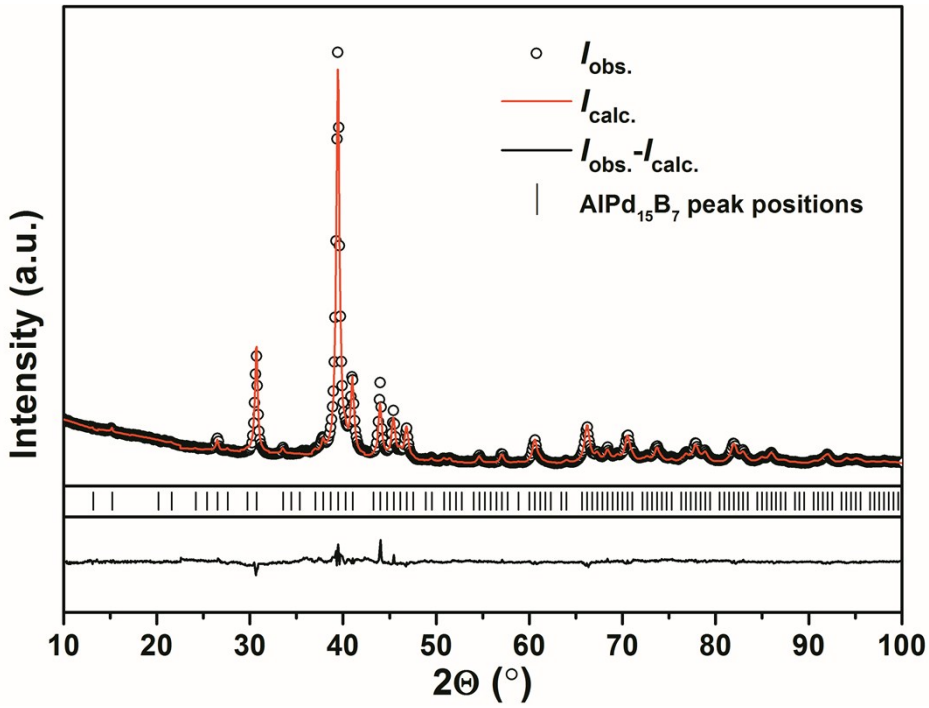

Figure S1. X-ray diffraction pattern of powders of an as-cast $AlPd_{15}B_7$ sample without stress annealing, showing broadening of all reflections, due to the ductility of the sample.

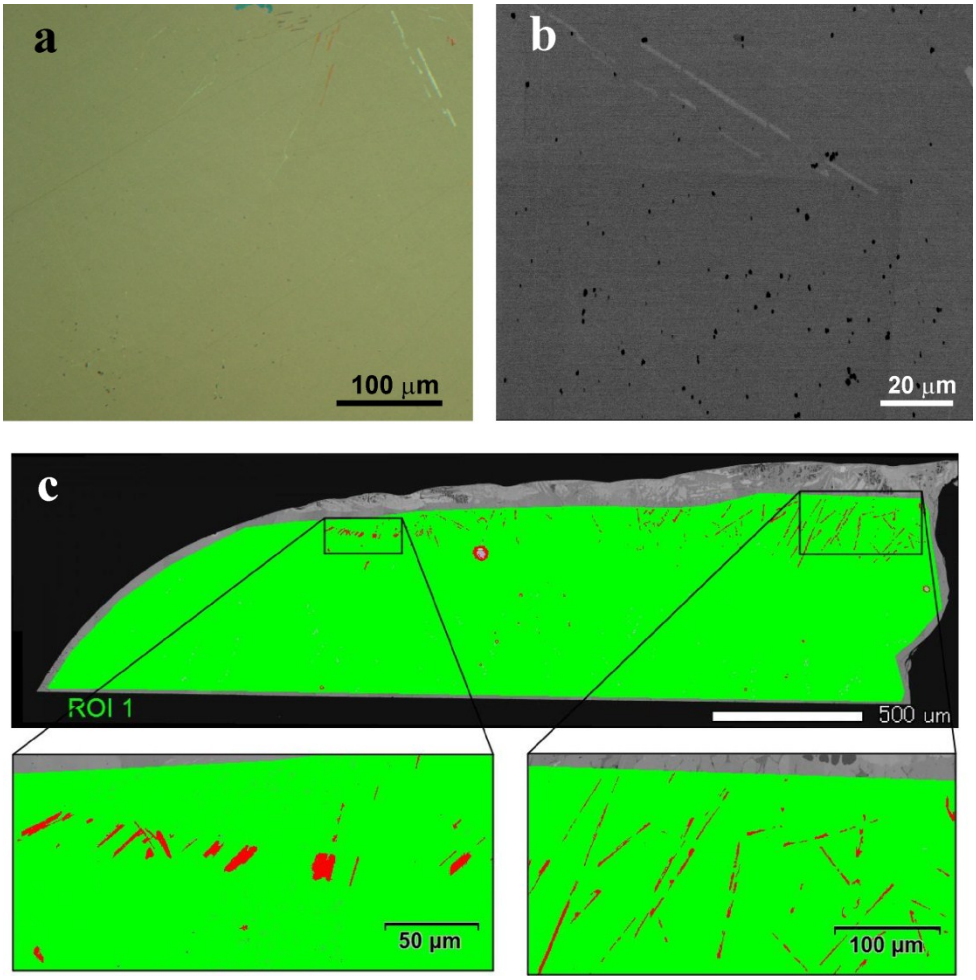

Figure S2. Microstructure of an as-cast $AlPd_{15}B_7$ sample: (a) an image from optical microscope and (b) a BSE image in SEM, both revealing a very low amount of impurities in this sample; (c) EDXS mapping, where green and red contrasts belong to the $AlPd_{15}B_7$ phase and impurities, respectively. The content of impurities is less than 1 vol.%

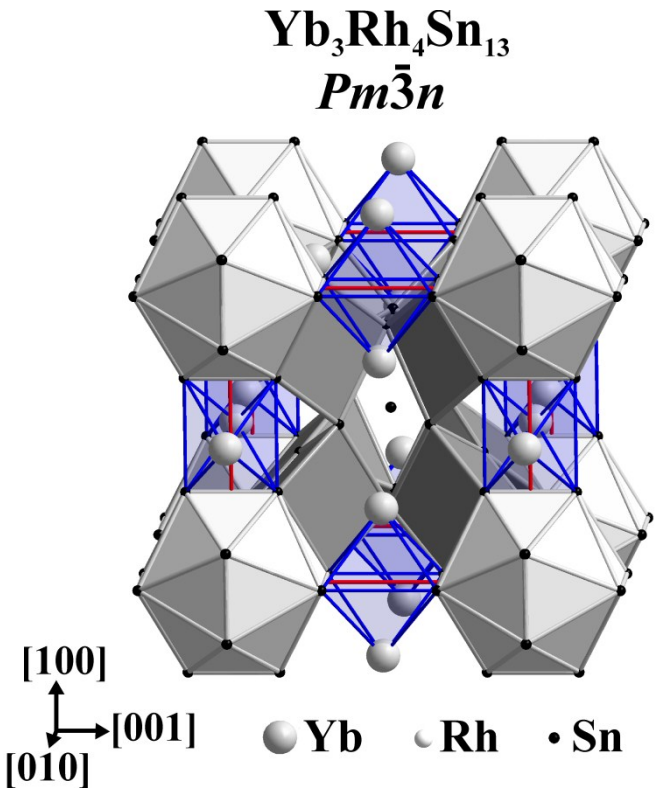

Figure S3. Crystal structure of $Yb_3Rh_4Sn_{13}$. [Sn@Sn_{12}] icosahedra – light gray; [Rh@Sn_6] trigonal prisms – dark gray; [□@Yb_2Sn_4] octahedra – blue.

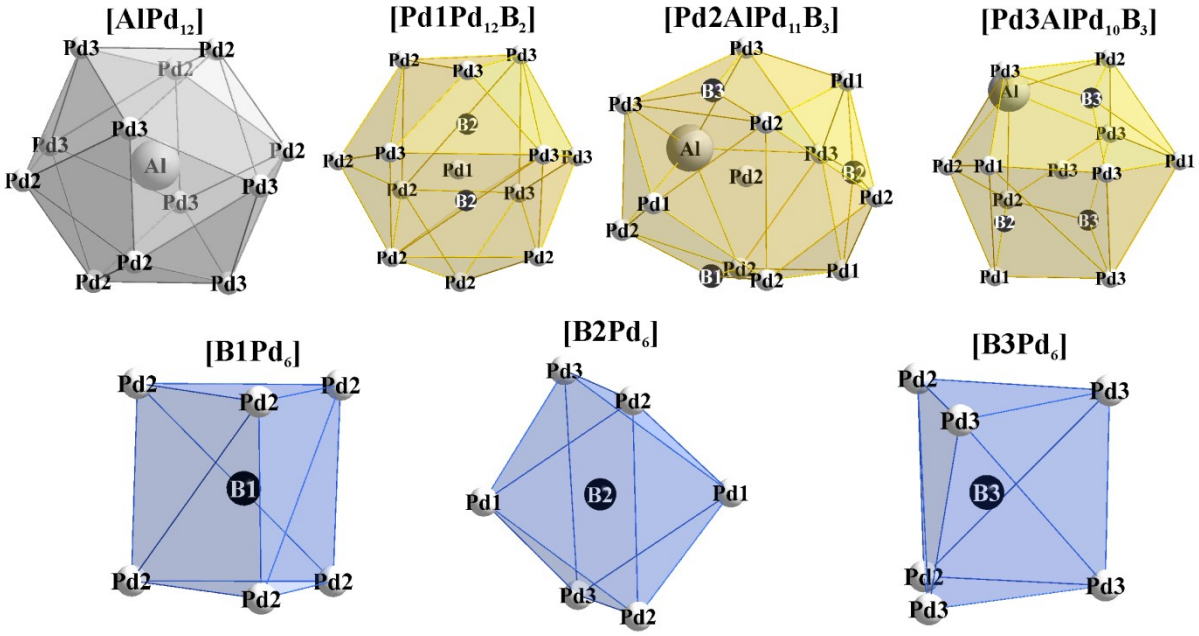

Figure S4. Coordination polyhedra in $AlPd_{15}B_7$

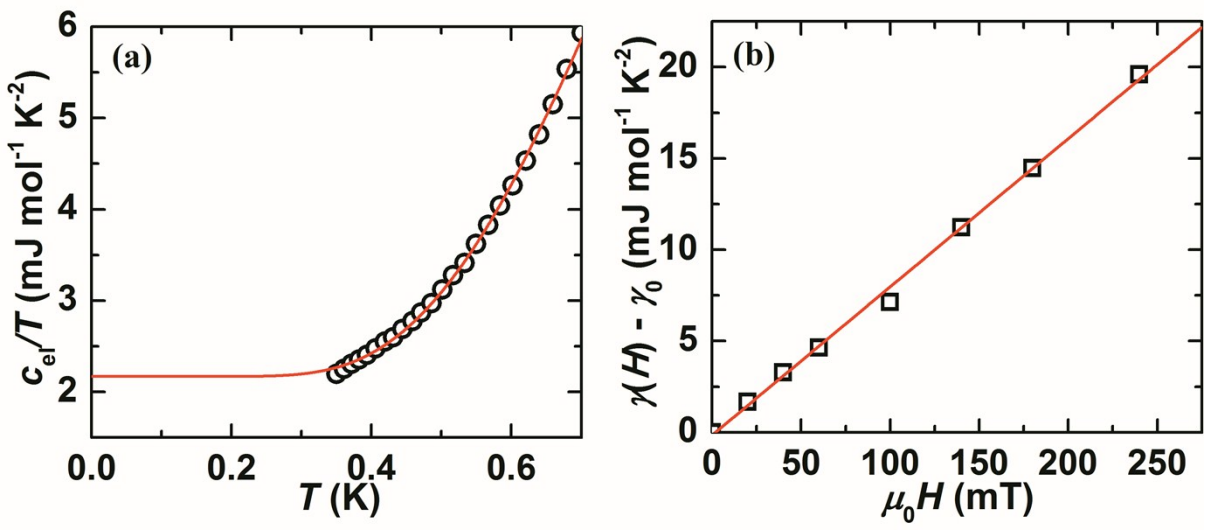

Figure S5. (a) Temperature dependence of c_{el}/T with the fit to $c_{el} = \gamma_0 T + \gamma T_c A e^{\frac{-\Delta(0)}{k_B T}}$; (b) $\gamma(H) - \gamma_0$ as a function of magnetic field $\mu_0 H$. The solid line shows a linear dependence of $\gamma(H) - \gamma_0$ *vs* $\mu_0 H$, indicating a typical *s*-wave gap for $AlPd_{15}B_7$.