Superconductivity and magnetism of new rare earth ternary borides synthesized under high pressure

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A new group of ternary borides has been synthesized at pressure of 8 GPa. The formula of ternary borides is RRh_4B_4. These materials were also found to crystallize, like $R(Rh_{0.85}Ru_{0.15})_4 B_4$, in a body-centered-tetragonal structure with space group $I4_1/acd$ like and 8 formula units per unit cell[1]. The superconducting and magnetic transition temperatures and lattice constants for new RRh_4B_4 compounds are shown in Table. The magnetism of RRh_4B_4 (where R=Dy, Ho, Er) is evident in the upper critical field H_{c2} vs. temperature data that are displayed in Figure. The data of heat capacity C/T of $DyRh_4B_4$ vs. temperature in zero applied magnetic field have revealed two lambda-type anomalies at T_{c2}=3.3 K and T_{c3}=2.5 K as well.

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[1]D.C. Johnston, Solid State Comm., **24**, 699 (1977).

R	a (A°)	c (A°)	T_c (K)	T_m (K)
Dy	7,453	14,950	4,6	3,3
Ho	7,452	14,862	6,1	
Er	7,432	14,822	7,4	
Tm	7,412	14,870	7,2	
Yb	7,449	14,851	-	-
Lu	7,449	14,815	9,0	-
Y	7,434	14,934	10,7	-