

Ru, Rh, Pd,
Os, Ir, Pt

VII 2709
1959

PrRu_2 , PrRh_2 , PrOs_2 , PrIr_2 , PrPt_2 ,
 NdRu_2 , NdRh_2 , NdIr_2 , NdPt_2 , GdRh_2 , GdIr_2 ,
 GdPt_2 , FmOs_2 , ScRu_2 , ScOs_2 , ScIr_2 , YRu_2 , YRe_2 ,
 YOs_2 , YIr_2 , YPt_2 , LaRu_2 , LaOs_2 , CeRu_2 , LuOs_2 ,
 HfRe_2 , HfOs_2 (Ttr)

Compton V.B., Matthias B.T.

Acta crystallogr., 1959, 12, N9, 651-54.

Laves phase compounds of rare earths and
of hafnium with noble metals.

RM, 1960, N4, 8425

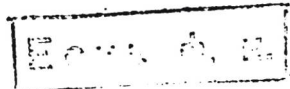
Be

1960 4 25

La_3Ru_2 , CeRu_2 , PrRu_2 (Tm) 1963

Reiswig R.D., Schneider L.A.,
VIII 2129

J. Less-Common Metals,
1963, 5, N5, 432-433



B. H.

PM, 1964, 1811

"M'" ($M' = \text{Sc, Y, La, Pr, Ti, V, Cr}$)
($M'' = \text{Rh, Ir, Ni, Pt}$) 1965.
| окрещен. сир-па)

Dwight A.B., Conner R.A.,
Jr., Dordney J.W., VIII 3949

Acta crystallogr.,
1965, 18, no. 835.

PM, 1965, 1044.

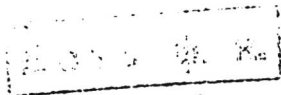
MM

100.000

MPd₃ / m = La, Ce, Pr, Nd, Sm, Eu, 1965
Yd, Tb, Dy, Ho, Er, Yb, Lu)
(Крест. сир-рз)

VIII 3986

Генрих I. R. Рауноч G. V.
J. Less - Common Metals,
1965, 9, n 4, 263-269



РХ, 1965, 225549.

М.

YCu , EuCu , YAg , YbAg , YbAu , YIn , LaIn , 1966
 PrIn , TmIn , YbIn , TbTe , TmPt_2 , YbPt_2 ,
 TbFe_2 , YbAu_2 , YAg_2 , YAl_3 , TbIn_3 , TmIn_3 ,
 YbIn_3 , EuTe_3 , TbTe_3 , TmTe_3 , LaPt_3 , PrPt_3 ,
 NdPt_3 , SmPt_3 , TbPt_3 , TmPt_3 , YbPt_3 , LaIn_3 ,
 CePt_3 , CeIn_3 , PrIn_3 , NdIn_3 , YbAl_3 .
 (крупн. сѣп-ра)

Moriarty J. L., Humphreys J. E.,
 Gordon R. O., Baerwigen R.,
 Acta Crystallogr., 1966, 21, n5, 840

PM, 1967, 3222 3 M.

SL 1966

VIII 4/82

Е. С. П. К.

بہشت، ایک جہنم

Pt₅Ln u Pt₃Ln. Ln = La - Tm.

1967.

III Abe.

VIII 3917

Bronger W.

J. Less-Common Metals, 1967, 12, N1, 63-68 (ann.).

Preparation and X-ray investigation of
platinum alloys with the rare-earth
metals (Pt₅Ln and Pt₃Ln phases).

MX, 1967, 135392.

⊙ ME

NOTES

VIII-5482

1968

$A_2 Pt_2 O_7$ (T_{tr}) , rge A = Se, In, Y ^{un}
P3M or Pr go Lu

Hoekstra H. R., Callagher F.,

Inorganic Chemistry,

1968, 7, 2553-2557

T.

ectb p.x.

VIII $2\text{Ln}_2\text{O}_3 \cdot \text{PbO}$ 1968
 $\text{Ln}_2\text{O}_3 \cdot 2\text{PbO}$ VIII 4292

Mr Daniel C. L. Schneider
S. Y.

Y. Res. Nat. Bur. Standards,
1968, A72, n1, 27-37 (1966)

PHC Xues, 215 850 (1968) ECT Q. R. me

Pd Fe₃, Pd Th₃, Pd Cd₃, Pd Tb₃, Pd U₃, Pd Zr₃,
Pd Sn₃, Pd Sc₃, Pd Zr₃, Pd Hf₃, Pd Ti₃. 1970
8 6 7 VII 5864 Химес. сир. р. 1970

Harris I. R., Noiman M.

"J. Less-Common Metals", 1970, 22, n. 1,
127-130 (англ).

Изменение периодов резонанс немо-
торых твердых растворов α-Pd-X и
соединений Pd₃X. ~~А.А.~~ ММ 20-68

РМ., 1971, 1438

$CeRu_2$; $Ce(Ru_{1-x}Mn_x)_2$, ARu_2 ($A=Pd, Ag, Au$) (T_{tc}) 1971
 $CeMn_2$, $CeCo_2$, $CeNi_2$, $CePt_2$, $CePd_2$, $CeRh_2$
Wilhelm M. Hillenbrand B.

An (p)

Physica (Utrecht), 1971, 55, 608-14
VIII 5447 (annul.)

Preparation and the superconducting properties of $CeRu_2$ and its mixed crystals with ARu_2 (A =rare earth element) and CeB_2 (B =man-ganese, iron, cobalt, nickel, copper, platinum, silver, gold, etc.)
CA, 1972, 46, 114, 78204h

ZrPt₅; CePt₅; PrPt₅; NdPt₅(C) ¹⁹⁷²_{VIII 5768}

Narasimham K.S.V.L., Rao V.U.S.,

Butera R.A.

An(CP)

AIP (Amer. Inst. Phys.) Conf. Proc., 1972
[Pub. 1973], N10 (Pt. 2), 1081-2 (Amer.)

Low-temperature specific heat and
magnetic properties of rare-earth-
-platinum (RPt₅, R = Lanthanum,
Cerium, praseodymium, neodymium)
intermetallic compounds.
CA, 1973, 79, N10, 59218m

$\text{Pr}_x \text{Ce}_{1-x} \text{Ru}_2$

1976

85:115797n Superconducting and ferromagnetic properties of praseodymium cerium ruthenium ($\text{Pr}_x \text{Ce}_{1-x} \text{Ru}_2$). Asada, Yuji (Natl. Res. Inst. Met., Tokyo, Japan). *J. Phys. Soc. Jpn.* 1976, 41(1), 26-31 (Eng). The specific heat of $\text{Pr}_x \text{Ce}_{1-x} \text{Ru}_2$ ($0.0 \leq x \leq 0.4$) were measured from 1.3 to 20 °K. The effective electron-electron interaction in Bardeen-Cooper-Schrieffer theory decreases monotonically with increasing x . The increase of the superconducting transition temp. for low Pr concns. depends mainly on the increase of the γ value. The magnetic contribution to the specific heat was obsd. for $x \geq 0.2$. The transition to the superconducting state becomes broad abruptly beyond $x = 0.3$, which is related to the magnetic ordering of Pr. The magnetic properties were measured for $0.0 \leq x \leq 1.0$. Pr possesses the magnetic moment of $3.57 \mu_B$ for all alloys. This value is very close to that of Pr^{3+} . In this alloy system the magnetic interaction destroys the supercond. before the ferromagnetism occurs.

(Cp)

C.A. 1976, 25 N16.

Pr Pd

1948

La Pd

La Pd₃/Pr Pd₃

[90] 128450x The heat capacity of lanthanum tripalladium and praseodymium tripalladium at low temperature. Machado da Silva, J. M. (Clarendon Lab., Oxford, Engl.). *Solid State Commun.* 1978, 28(10), 857-9 (Enr). Heat capacity was detd. of LaPd₃ [12031-23-1] and PrPd₃ [12165-81-3] at low temp. using adiabatic calorimeter. Values of electronic heat capacity coeff. $\gamma = 0.33 \pm 0.01$ mJ/K² atom and Debye temp. $\theta_D = 176 \pm 1$ K were found for LaPd₃. PrPd₃ shows magnetic ordering below 0.6 K and a Schottky anomaly whose max. lies around 0.8 K. The cryst. field at the Pr³⁺ site creates a Γ_3 (doublet) excited state lying 4 K above the Γ_5 (triplet) ground state.

(F-1)

⊠

Cp; θ_D

C.A. 1949, 90, N16

[XVIII - 7071]

1978

Prpt

Palenzona A; Ciradici's
S.,

ΔHf;

Thermochim. acta, 1978,
28, N 2, 252-256.

1980

PrPt₅NdPt₅GdPt₅TbPt₅DyPt₅HoPt₅ErPt₅TmPt₅

(Tevie)

93: 105973t Low temperature magnetic susceptibilities of rare earth-platinum (RPt₅) compounds (R = praseodymium, neodymium, gadolinium, terbium, dysprosium, holmium, erbium, thulium). Ikonomou, P. F.; Marcopoulos, V. G.; Yakinthos, J. K. (Nucl. Res. Cent. Demokritos, Athens, Greece). *J. Less-Common Met.* 1980, 71(1), P13-P18 (Eng). The magnetic susceptibilities of 8 RPt₅ compds. (R = Pr, Nd, Gd, Tb, Dy, Ho, Er, Tm) with 3 different crystallog. structures are reported for 200-4.2 K. These compds. follow Curie-Weiss behavior above 45 K with Curie paramagnetic temps. between -20 and 13.5 K. The effective moments obtained, considering that Pt does not carry any magnetic moment and that a rare earth has a 3+ valence, agree well with the theor. values calcd. by using Hund's rules. At low temps. NdPt₅, DyPt₅ and TmPt₅ show ferrimagnetic behavior. TbPt₅ is ferromagnetic and GdPt₅ shows a temp.-independent susceptibility below 15 K. The compds. do not follow De Gennes' law. Satn. in magnetization was not achieved up to 19 kOe. The ordering temps. of all the compds. must be lower than 4.2 K.

P. H. 1980. 93 N10

(+4) [X]

Pr Ir
Pr Pt
Pr Rh
Pr Ru

1980

7

11 E333. Сверхтонкая теплоемкость соединений PrX_2 ($\text{X}=\text{Ir}, \text{Pt}, \text{Rh}, \text{Ru}$) со структурой фаз Лавеса. Hyperfine specific heats of PrX_2 ($\text{X}=\text{Ir}, \text{Pt}, \text{Rh}, \text{Ru}$) Laves phase compounds. Greidanus F. J. A. M., De Jongh L. J., Huiskamp W. J., Buschow K. H. J. —Proceedings of the International Conference on Magnetism, Munich, 3—7 Sept., 1979. Part 3. — «J. Magn. and Magn. Mater.», 1980, 15—18, № 3, 1231—1232 (англ.)

При измерениях теплоемкости соединений C15 PrX_2 ($\text{X}=\text{Ir}, \text{Pt}, \text{Rh}, \text{Ru}$) при T -рах до 1°K в магн. поле до 2 тл обнаружена аномалия Шоттки, которую можно приписать сверхтонкому взаимодействию между электронным и ядерным спинами Pr^{3+} . Определены константы взаимодействия A (J), лежащие в пределах $0,150 \div 0,160^\circ\text{K}$. Величина моментов составляет $\approx 70\%$ от их значения при $J=4$, что свидетельствует о частичном замораживании момента иона Pr^{3+} вследствие взаимодействия с кристаллич. полем. А. С. Андреев

(Cp)

ф. 1980. № 11

1980

 Pr Ir_2 Pr Pt_2 Pr Rh_2 Pr Ru_2

(Cp)

94: 75739x Hyperfine ~~interaction~~ of PrX_2 ($X = \text{Ir, Pt, Rh, Ru}$) laves phase compounds; Greidanus, F. J. A. M.; De Jongh, L. J.; Huiskamp, W. J.; Buschow, K. H. J. (Kamerlingh Onnes Lab., Rijksuniv., Leiden, Neth.). *J. Magn. Magn. Mater.* 1980, 15-18(3), 1231-2 (Eng). Sp. heat data at <1 K for the C15 compds. PrX_2 ($X = \text{Ir, Pr, Rh, Ru}$) reveal Schottky-type anomalies, ascribed to hyperfine interactions. Apparently the $4f$ -moments are magnetically ordered. The values deduced for these moments are $\approx 70\%$ of that for $J = 4$, indicating that the Pr^{3+} moment is partially quenched by the crystal field.

C. A. 1981.94 N10

1980

Pr Ir₂Pr Pt₂Pr Rh₂Pr Ru₂

94: 91410y Specific heat, differential susceptibility and electrical resistivity of PrX₂ (X = Ir, Pt, Rh and Ru) laves phase compounds at temperatures 1.4 K < T < 40 K. Van Dongen, J. C. M.; Van der Linden, H. W. M.; Gredanus, F. J. A. M.; Nieuwenhuys, G. J.; Mydosh, J. A.; Buschow, K. H. J. (Kamerlingh Onnes Lab., Rijksuniv., Leiden, Ned.). *J. Magn. Magn. Mater.* 1980, 15-18(3), 1145-6 (Eng). Sp. heat and differential magnetic susceptibility data of PrX₂ (X = Ir, Pt, Rh, and Ru) compds. show phase transitions at $T_c = (11.2 \pm 0.5)$, (7.7 ± 0.5) , (7.9 ± 0.5) , and (33.9 ± 0.5) K, resp. The elec. resistivity drops markedly below T_c , and the $d\rho/dT$ vs. T curve is similar to that of the sp. heat.

T_{tr}; C_p.

C.A. 1981:94N12

PrPd_3

Ommuck 13800

1981

Machado da Silva

J. M., Gardner W. E.,
et al.

Ti_2Co

Portgal. Phys. - Vol. 12,
fasc. 1-2, pp. 61-98, 1981.

PrPt

1982

98: 26602w Magnetic properties and structures of praseodymium-platinum (PrPt) and neodymium-platinum (NdPt). Castets, A.; Gignoux, D.; Gomez-Sal, J. C.; Roudaut, E. (Lab. Louis Neel, CNRS, 38042 Grenoble, Fr.). *Solid State Commun.* 1982, 44(8), 1329-34 (Eng). The magnetic properties of the CrB-type orthorhombic phase of PrPt and NdPt are presented. Below their ordering temps., which are 15 and 23 K, resp., these compds. exhibit a ferromagnetic behavior. The magnetic structures detd. by neutron diffraction are collinear. While in PrPt, the magnetic moments are parallel to c, in NdPt, the moments lie in the (a,c) plane and make an angle of 22° with a. These properties and esp. the peculiar moment direction in NdPt are discussed in terms of cryst. elec. field effects on the rare earth ion.

T_z ;



C. A. 1983, 98, N4.

Prkiz

[Om. 16744]

1983

Marxism.
cb-ba

Griedanus F. J. A. M.,
Jongh L. J., et al.,
Physica, 1983, Bc119,
N 3, 215-227.

Pr Y₂

[On. 16744]

1983

Greidaners F. J. A. M.,
Marum. Jongh L. J., et al.,
cb-ba Physica, 1983, BC 119,
N3, 215-227.

Pr Rh₂

[Um. 16744]

1983

Marum.
cb-ba

Griedanus F. J. A. M.,
Jongh L. J., et al.,
Physica, 1983, Bc 119,
N 3, 215-227.

PrPt₂

Om. 16744

1983

99: 31988b Magnetic properties of PrX₂ compounds (X = Pt, Rh, Ru, Ir) studied by hyperfine specific heat, magnetization and neutron-diffraction measurements. Greidanus, F. J. A. M.; De Jongh, L. J.; Huiskamp, W. J.; Fischer, P.; Furrer, A.; Buschow, K. H. J. (Kamerlingh Onnes Lab., Rijksuniv Leiden, Leiden, Neth.). *Physica B+C (Amsterdam)* 1983, 119(3), 215-27 (Eng). The temp. and magnetic field dependences were detd. of the magnetic moment of the cubic PrX₂ compds. (X = Pt, Rh, Ru, Ir)

from hyperfine specific-heat, magnetization and neutron-diffraction measurements. The results were compared with a mean-field calcn., taking cryst. elec. field and bilinear (dipolar) exchange interactions into account. Adopting exptl. values of the Lea, Leask and Wolf parameters (1962) X and W from inelastic neutron scattering results, the magnetic data and the mean-field theory agree. An obsd. discrepancy of ~15% between the calcd. and measured satn. values of the spontaneous magnetization can be explained by the presence of quadrupolar interactions.

G⁰.

(43) 

C. A. 1983, 99, n 4

PrRh₂, PrRu₂,
PrIr₂

PrPt_2

оч. 10745

1983

19 Б1016. Теплоемкость, сопротивление и восприимчивость на переменном токе кубических соединений PrX_2 ($\text{X}=\text{Pt}, \text{Ru}, \text{Ir}, \text{Rh}$). Specific heat, resistivity, and ac susceptibility of the cubic PrX_2 compounds ($\text{X}=\text{Pt}, \text{Ru}, \text{Ir}, \text{Rh}$). Greidanus F. J. A. M., Nieuwenhuys G. J., de Jongh L. J., Huiskamp W. J., Buschow K. H. J., Capel H. W. «Physica», 1983, BC119, № 3, 228—242 (англ.)

Проведены измерения теплоемкости, дифференциальной восприимчивости и электрич. сопротивления соединений PrX_2 ($\text{X}=\text{Ir}, \text{Pt}, \text{Rh}, \text{Ru}$) и обнаружены ферромагнитные фазовые переходы при $T_c=11,2\pm 0,5\text{K}$, $7,7\pm$

$C_p, T_{\pm 2}$

(43) 



$\text{PrRu}_2, \text{PrIr}_2,$
 PrRh_2

x. 1983, 19, N 19

$\pm 0,5\text{K}$, $7,9 \pm 0,5\text{K}$ и $33,9 \pm 0,5\text{K}$ для $X = \text{Ir}$, Pt , Rh , Ru соотв. Зависимость дифференциальной восприимчивости от T -ры согласуется с моделью анизотропного ферромагнетика, для которого уменьшение восприимчивости ниже максимума может быть приписано к блокированию движений доменных стенок с понижением T -ры. Показано, что все соединения PrX_2 при T -рах жидкого гелия упорядочены ферромагнитно. Результаты измерений теплоемкости сравнены с результатами расчетов на основе теории средн. поля с билинейными обменными взаимодействиями. Наличие широких вторичных максимумов в T -ной зависимости теплоемкости PrRh_2 , PrRu_2 и в особенности PrIr ниже T_c могут быть объяснены присутствием квадрупольных обменных взаимодействий. Отсутствие таких максимумов в теплоемкости PrPt_2 связано с присутствием синглетного основного состояния. Результаты измерений электр. сопротивления подтверждают влияние квадрупольных взаимодействий на переход. С. К. Карепанов

PrPt₂

Oct. 16th 45

1983

C_p⁰, T_{tr};

99: 31989c Specific heat, resistivity, and a.c. susceptibility of the cubic PrX₂ compounds (X = Pt, Ru, Ir, Rh). Greidanus, F. J. A. M.; Nieuwenhuys, G. J.; De Jongh, L. J.; Huiskamp, W. J.; Capel, H. W.; Buschow, K. H. J. (Kamerlingh Onnes Lab., Rijksuniv. Leiden, Leiden, Neth.). *Physica B+C (Amsterdam)* 1983, 119(3), 228-42 (Eng). Specific-heat, differential susceptibility and elec. resistivity were measured on PrX₂ (X = Ir, Pt, Rh, Ru) compds. Phase transitions occur at T_c = 11.2 ± 0.5, 7.7 ± 0.5, 7.9 ± 0.5, and 33.9 ± 0.5 K for X = Ir, Pt, Rh and Ru, resp. From earlier neutron inelastic scattering expts., the cryst. elec. field levels of these compds. were detd. The specific-heat results were compared with the results of a mean-field calcn., assuming bilinear exchange interactions. The presence of broad secondary max. in the temp. dependence of the sp. heat of PrRh₂, PrRu₂ and esp. PrIr₂ can qual. be explained by the presence of biquadratic (quadrupolar) interactions. The behavior of the susceptibility agrees with ferromagnetic ordering. The elec. resistivity drops markedly below T_c, and the dρ/dT vs. T curve is similar to that of the sp. heat.

(+3) ~~17~~

c.A. 1983, 99, N 4

PrRu₂, PrIr₂,
PrRh₂

P₂Rh₂

[Om. 16745]

1983

Greidanus F. J. A. M.,
Nieuwenhuys G. J.,
et al.,

Physica, 1983, Bell 9,
N 3, 228-242.

Ср, электро
сопротивл.,
магнетизм.
восприимчив.
T_c;

Pr Gr₂ [Om. 16745] 1983

Freidanus F. G. A. M.,
Nieuwenhuys G. G.,
et al.,

Ср, тректо
сопротивл,
магнитно-
восприимчив.
Тс;

Physica, 1983, BC119,
N 3, 228-242.

Pr Ruiz

[Om. 16745]

1983

Ср, секретно
сопротивл.,
магнитн.
вопросами.
Te;

Greidanus F. J. A. M.,
Nieuwenhuys G. J.,
et al.,

Physica, 1983, Bell,
N 3, 228-242.

PrRuO_3

1986

8 Б3135. Влияние высокого давления на некоторые системы из оксидов рутения и лантаноидов синтез перовскитной фазы PrRuO_3 . Effects of high pressure on some lanthanide ruthenium oxide systems: synthesis of the perovskite phase PrRuO_3 . Greatrex R., Hu G., Munro D. C. «Mater. Res. Bull.», 1986, 21, № 7, 797—802 (англ.)

С помощью рентгенографии и измерений электропроводности изучено влияние давл. на фазовые соотношения в системах RuO_2 (I) — Ln_2O_3 , где $\text{Ln} = \text{Nd}, \text{Sm}$ [Pr_6O_{11} (II) для $\text{Ln} = \text{Pr}$]. Установлено, что при нагревании смесей I, II и Ru при т-ре 1400°C и давл. 2 ГПа и выше, образуется PrRuO_3 (III) — фаза со структурой перовскита, тогда как другие РЗЭ не образуют перовскитоподобных фаз при т-рах до 1600°C и давл. до 5,5 ГПа. III — ортомбич.; $Pbnm$; a 539,1; b 585,1; c 775,3 пм. III — полупроводник с энергией активации $0,17 \pm 0,02$ эВ. Л. Г. Титов

Х. 1987, 19, N 8

$PtPd_3S_4$

1986

Цыганков В. Н.,

Петров К. И.

Ж. неорган. химии,
1986, 31, N1, 191-192.

(см. $GdCoO_3$; I)

$\text{Pr Rh}_4 \text{B}_4$

(DM. 28880)

1987

Kumagai K., Ooyama T.
et al.,

сверхпро-
водимость
и
магнитн.
св-ва

Physica, 1987, BC148,
N 1-3, 133-136.

MPd_3 (xp)
 $M = \text{Pr}, \text{Nd},$
 $\text{Dy}, \text{Ho}, \text{Er}, \text{Tm},$
 Tb
(G)

(Om. 29501) 1988

108: 141816f Magnetic moments and low-temperature heat capacity in a magnetic field of some rare earth-palladium (REPd_3) compounds. Drewes, W.; Leson, A.; Schelp, W.; Purwins, H. G. (Inst. Angew. Phys., Univ. Muenster, D-4400 Muenster, Fed. Rep. Ger.). *J. Phys. F: Met. Phys.* 1988, 18(1), 137-52 (Eng). The magnetization was measured on REPd_3 crystals ($\text{RE} = \text{Pr}, \text{Nd}, \text{Dy}, \text{Ho}$) at 2.100 K and to ≥ 8 T. The molar heat capacity was also measured on polycryst. REPd_3 ($\text{RE} = \text{Pr}, \text{Nd}, \text{Tb}, \text{Dy}, \text{Ho}, \text{Er}, \text{Tm}$) compds. for different magnetic fields at 1.5-17 K. The exptl. results are interpreted in terms of a cubic cryst. elec. field using a simple mol. field approxn. for the exchange interaction. A comparison of the reduced crystal field parameters for the REPd_3 compds. shows systematic behavior and supports the phys. relevance of the applied mode.

(76) 17

C.A. 1988, 108, N16

$\text{NdPd}_3, \text{DyPd}_3,$
 $\text{HoPd}_3, \text{ErPd}_3, \text{TmPd}_3,$
 TbPd_3

$\text{PrRh}_{4,8}\text{B}_2$

1988

17 Б2047. Кристаллическая структура $\text{PrRh}_{4,8}\text{B}_2$. Crystal structure of $\text{PrRh}_{4,8}\text{B}_2$. Higashi I., Shishido T., Takei H., Kobayashi T. «J. Less-Common Metals», 1988, 139, № 2, 211—220 (англ.)

Проведен РСТА $\text{PrRh}_{4,8}\text{B}_2$ (I, λMo , прямые методы, МНК, R 0,055, 1176 отражений), полученного из р-ра в расплаве с использованием в кач-ве р-рителя Cu ($\text{Pr}-\text{Rh}-\text{B}-\text{Cu}$) с послед. медленным охлаждением от 1400°C в He -атмосфере. I ромбич.: a 9,697, b 5,577, c 25,64 Å, Z 12, ф. гр. $Im\bar{m}m$. Структура I описана как упаковка вдоль оси c пачек, выявленных в СТ модифицированного CeCo_3B_2 . В основе пачек лежит $\alpha\alpha$ -упаковка 4 Rh-сеток КагOME типа (3636), в такой Rh-упаковке находятся атомы Pr и B, в локальном окружении которых 12 Rh представляют гексагон. призмы и 6 Rh — тригон. призмы соотв. Два др. кристаллографически независимых атома Rh статистически с вероятностью 27% и 33% занимают межпачечное пространство, образуя гексагон. сетки 6^3 с ближайшим расстоянием Rh—Rh 1,6 Å. Монокристаллы I обладают чрезвычайной пластичностью и спайностью по (001) что указывает на слабую связь между пачками,

кристал.
структура

Л. 1988, 19, N 17.

осуществляемую гексагон. сетками со статистически
заселенными позициями атомов $Rh_{(5)}$ и $Rh_{(6)}$. Г. Д. И.

$\text{Pr}_3\text{Ru}_3\text{O}_{11}$

1990

20 Б2276. Восстановленные рутенаты: $\text{Pr}_3\text{Ru}_3\text{O}_{11}$, $\text{Nd}_3\text{Ru}_3\text{O}_{11}$ и Pr_3RuO_7 . Reduced ruthenates: $\text{Pr}_3\text{Ru}_3\text{O}_{11}$, $\text{Nd}_3\text{Ru}_3\text{O}_{11}$ and Pr_3RuO_7 : [Pap.] 15th Congr. Int. Union Crystallogr., Bordeaux, 19–28 July, 1990 / Averdiek B. M., Jeitschko W. // Acta crystallogr. A.— 1990.— 46, Suppl.— C. 276.— Англ.

При р-ции металлич. Ru, Ln_2O_3 в присутствии смеси $\text{KClO}_3 + \text{KCl}$ в вакууме при нагревании получены кубич. $\text{Ln}_3\text{Ru}_3\text{O}_{11}$, с $\text{Ln} = \text{Pr}$ (I), Nd (II), относящиеся к СТ $\text{Bi}_3\text{Ru}_3\text{O}_{11}$ с a 937,73 и 935,52 пм. При р-ции Pr_6O_{11} и RuO_2 в кварцевой трубке получен ромбич. (СТ La_3NbO_7) Pr_3RuO_7 , имеющий a 1097,9, b 738,8, c 752,9 пм. Для I установлены парамагн. св-ва с эффективным магн. моментом 4,33 μ_B , указывающим на вклад наряду с атомами Pr и атомов Ru. I является металлич. проводником. Для II уточнена крист. структура (R 0,014 по 884 отражениям) и установлено взаимодействие металл-металл ($\text{Ru}-\text{Ru}$ 259,9 пм). М. Б. Варфоломеев

структура

⊗ (II)

X. 1991, N 20

1990
Pr Pt₅ Jacob K. T.; Waseda Y.

$\Delta G,$
 ΔH_f

Bull. Mater. Sci. 1990,
13 (4), 235-44.

(cur. ● La Pt₅; I)

Pr Pd x

1992

22 Б3056. Фазовая диаграмма (системы) Pd—Pr (при содержании) менее 50 ат.% Pr. The phase diagram of Pd—Pr below 50 at.% Pr /Zhang Kanghou, Chen Lili //J. Alloys and Compounds .—1992 .—184 ,№ 2 .—С. L9—L14 .—Англ.

С помощью ДТА, РФА и оптич. микроскопии исследовано вз-вие в системе Pd—Pr в интервале 0—50 ат.% Pr. Построена фазовая диаграмма. В исследованном концентрац. интервале образуется шесть интерметаллич. соедин. PrPd_5 , PrPd_3 , PrPd_2 , Pr_2Pd_3 , Pr_4Pd_5 , PrPd , три эвтектики (при 1041 ± 4 , 997 ± 4 и $1005 \pm 4^\circ \text{C}$) и три перитектики (при 1123 ± 4 , 1071 ± 4 и $1033 \pm 4^\circ \text{C}$).
Б. Г. Коршунов

T_m

X. 1992, № 22-24

Pz Ru₂

1994

Guo Qiti; Kleppa O.J.

Metall. Mater. Trans. B

(4fM)

1994, 25B (1), 73-7.

( cell. Pz Ni₅ ; I)

PrPd
PrPd₂

1994

Guo Qiti, Kleppa O.J.

Metall. Mater. Trans. B

1994, 25B (1), 73-7.

($\Delta_f H$)

( PrNi_5 ; $\bar{I}$)

P_2Rh_2

1994

Guo Qiti, Kleppa O. J.

Metall. Mater. Trans. B

(A + M) 1994, 25B (1), 73-7.

( cell. P_2Ni_5 ; $\underline{I}$)

Pt Pt

1994

Pt Pt₂

Guo Qiti, Kleppa O. J.
Metall. Mater. Trans. B
1994, 25B (1), 73-7.

(A_f M)

(cu. ● Pt Ni₅ ; I).

Pz Ir₂

1994

Guio Qiti, Kleppa O.J.

Metall. Mater. Trans. B

(A_fM)

1994, 25B (1), 73-7.

(see. ● Pz Ni₅ ; I)

PzRhSB

1994

PzPdSB

Malik S. K.,

Takeya H. et al.

J. Alloys and Compounds

Cp

1994. 207-208. C. 237-240.

(cer. ● LaRhSB; I)

$\text{Pr Pd}_2 \text{Al}_3$

1996

Ghosh, K; Ramakrishnan, S;
et al;

(Gp) *Physica B* (Amsterdam)
1996, 223-224 (1-4), 354-58

(see $\text{Ce Pd}_2 \text{Al}_3$ ●; I)

Pr Pd₂ Ga₃

1997

126: 271207r Transport, magnetic, and thermodynamic properties of REPd_2Ga_3 , RE = Pr, Nd, Sm. Bauer, E.; Liendl, M.; Naber, L.; Werner, D.; Michor, H.; Hilscher, G.; Donni, A.; Fischer, P.; Fauth, F.; Zolliker, M. (Institut Experimentalphysik, Technische Universitaet Wien, A-1040 Vienna, Austria). *Z. Phys. B: Condens. Matter* 1997, 102(3), 291-298 (Eng), Springer. We present various investigations on the transport, magnetic, and thermodyn. properties of the new ternary compds. REPd_2Ga_3 with RE = Pr, Nd, Sm. While PrPd_2Ga_3 does not show long-range magnetic order ≥ 0.3 K, both NdPd_2Ga_3 and SmPd_2Ga_3 order magnetically. The latter exhibits a ferromagnetic ground state with weak ordered moments at $T_c < 16.9$ K and the former orders antiferromagnetically at $T_N < 6.5$ K with ordered Nd moments of $1.99(4) \mu_B$ at satn. in the basal plane oriented perpendicular to the propagation vector $k = [1/2, 0, 0]$. The possibility of a Kondo-type interaction in PrPd_2Ga_3 is discussed.

memo given
cb - ba



(+2)

Nd Pd₂ Ga₃,



Sm Pd₂ Ga₃

C. A. 1997, 126, N20

Pr_2RuO_5

2001

135: 365598g Thermodynamic properties of RE_2RuO_5 (RE=Pr, Nd, Sm, Gd and Tb). Cao, G.; McCall, S.; Zhou, Z. X.; Alexander, C. S.; Crow, J. E.; Guertin, R. P. (National High Magnetic Field Laboratory, Tallahassee, FL 32310 USA). *J. Magn. Magn. Mater.* 2001, 226-230(Pt. 1), 218-220 (Eng), Elsevier Science B.V. RE_2RuO_5 (R = Nd, Sm, Eu, Gd, Tb) is a new class of materials, and is insulating and magnetically ordered with an ordering temp. varying from 8-21 K. The magnetic ground state probably is antiferromagnetic with a canted spin structure that leads to ferromagnetic behavior. The satn. moment is suppressed particularly for Gd_2RuO_5 and Tb_2RuO_5 . The coeff. of the electronic sp. heat for all compds. is conspicuously large ranging from 680-800 mJ/mol K^2 . All results of this study indicate that the thermodyn. properties are chiefly dominated by 4d-electrons that are strongly coupled through Ru-O-Ru chains along the b-axis, which largely overwhelms exchange interactions between rare-earth ions.

meprmg.
cf - 12

(14)



Nd_2RuO_5



Sm_2RuO_5

Pr_2RuO_5

Tb_2RuO_5

C.A. 2001, 135, NR5

P: Pr₂RuO₅

P: 1

2001

135:13290 Magnetic ordering and enhanced electronic heat capacity in insulating L₂RuO₅ (L=Pr, Nd, Sm, Gd, and Tb). Cao, G.; McCall, S.; Zhou, Z. X.; Alexander, C. S.; Crow, J. E.; Guertin, R. P.; Mielke, C. H. National High Magnetic Field Laboratory, Tallahassee, FL, USA. Phys. Rev. B: Condens. Matter Mater. Phys. (2001), 63(14), 144427/1-144427/10. in English.

Polycryst. samples of the lanthanide ruthenate series L₂RuO₅ (L = Pr, Nd, Sm, Gd, and Tb) magnetically order in the range $8 < T < 24$ K with the ordering involving both the L and Ru cations. The series has a complex orthorhombic structure (space group Pnma) possessing chains of RuO₅ 5 O coordinated square pyramids which are corner-sharing and 2 inequivalent 7 coordinated L sites which are edge-sharing. At T_M a weak ferromagnetic moment emerges upon cooling, most likely due to a canted antiferromagnetic spin configuration. Isothermal d.c. and



pulsed field magnetization for $T < T_M$ reveal field induced magnetic transitions for $H < 5$ T but the approach to full free ion magnetic satn. is incomplete even at fields to 60 T due to the influence of cryst. elec. fields on the L ions. The low temp. linear sp. heat coeff., γ , for 4 compds. is anomalously large, ranging from γ 229. $^{\circ}$ -774 mJ/mol K², for L = Nd and L = Gd, resp. These values are comparable to those for heavy fermion systems, yet all 5 members of the L₂RuO₅ series exhibit semiconducting to insulating behavior. Isomorphic Gd₂TiO₅, where Ti with no unpaired d electrons (4d⁰ configuration) replaces Ru (4d⁴ configuration), has a vanishingly small γ , indicating that the thermodyn. properties of L₂RuO₅ are dominated by unpaired 4d electrons. The 4d electrons significantly enhance the L-L interaction, as demonstrated by the dramatic increase in ordering temp. for Gd₂RuO₅ ($T_M = 10$ K) compared to Gd₂TiO₅ which does not appear to order magnetically.

Pr-Pd-O

2001

Pr-Pd-O

135: 186150h System Pr-Pd-O: phase diagram and thermodynamic properties of ternary oxides using solid-state cells with special features. Jacob, K. T.; Lwin, K. T.; Waseda, Yoshio (Department of Metallurgy, Indian Institute of Science, Bangalore, India). *Z. Metallkd.* 2001, 92(7), 731-739 (Eng), Carl Hanser Verlag. An isothermal section of the phase diagram for the system Pr-Pd-O at 1223 K has been established by equilibration of specimens representing 13 different compns., and phase identification after quenching by using optical microscopy, SEM, x-ray diffraction, and EDX. The binary oxide PdO was not stable at 1223 K. Three oxide phases were stable along the binary Pr-O and were Pr_2O_3 , Pr_7O_{12} and phase of variable compn. between these two oxides. Two ternary oxides Pr_4PdO_7 and $\text{Pr}_2\text{Pd}_2\text{O}_5$ were identified, and their crystal structures were detd. Liq. alloys, intermetallic compds. PrPd , Pr_3Pd_4 , PrPd_3 , PrPd_5 , and Pd-rich solid soln. were in equil. with Pr_2O_3 . Based on the phase relations, two solid-state cells were designed to measure the Gibbs energies of formation of the two ternary oxides. An advanced version of the solid-state cell

C.R. 2001, 135, N13

incorporating a buffer electrode was used for high temp. thermodyn. measurements. The function of the buffer electrode, placed between the ref. and working electrodes, was to absorb the electrochem. flux of the mobile species through the solid electrolyte caused by trace electronic cond. The buffer electrode prevented polarization of the measuring electrode and insured accurate data. Yttria-stabilized zirconia was used as the solid electrolyte and oxygen gas at a pressure of 0.1 MPa was used as the ref. electrode. Emf. measurements, conducted at 925–1400 K and indicated a third ternary oxide Pr_2PdO_4 stable below 1150 ± 9 K. Addnl. solid state cells were designed to study this compd. The std. Gibbs energy of formation of the interoxide compds. from their component binary oxides Pr_2O_3 and PdO can be represented by equations. Crystallog. data for all three ternary oxides have been detd. based on the thermodyn. information, isobaric phase diagrams, and isothermal chem. potential diagrams for the system Pr-Pd-O are developed.

Pr_3RuO_7

F: Pr_3RuO_7 C_p (2 — 400 K, $T_{tr} = 382 \text{ K}$)
P: 1

03.05-19Б3.31. Магнитные и калориметрические исследования одномерных $\text{Ln}[\text{3}]\text{RuO}[\text{7}]$. Magnetic and calorimetric studies on one-dimensional $\text{Ln}[\text{3}]\text{Ru}$ ($\text{Ln}=\text{Pr}, \text{Gd}$) / Harada Daijitsu, Hinatsu Yukio // J. Solid State Chem. - 20 164, N 1. - С. 163-168. - Англ.

Магнитная восприимчивость 'хи' и теплоемкость $C[p]$ $\text{Ln}[\text{3}]\text{RuO}[\text{7}]$ ($\text{Ln}=\text{Pr}, \text{Gd}$ определены в интервале 2-400 К. Кристаллическая структура установлена мет РФА на порошках, пр. гр. Cmcm , блочная структура состоит из одномерных це $\text{RuO}[\text{6}]$, параллельных оси с, и псевдокубов $\text{LnO}[\text{8}]$, содержащих $1/3$ ионов Ln Блоки разделены полиэдрами $\text{LnO}[\text{7}]$. Структура характеризуется магнитными взаимодействиями между ионами $\text{Ru}\{5+\}$ в цепи и взаимодействиями между иона $\text{Ru}\{5+\}$ и $\text{Ln}\{3+\}$. Установлены аномалии $C[p]$ и 'хи' при 55 К для $\text{Pr}[\text{3}]\text{RuO}[\text{7}]$, 15 К для $\text{Gd}[\text{3}]\text{RuO}[\text{7}]$, а также структурный переход при 382 К для $\text{Gd}[\text{3}]\text{RuO}[\text{7}]$

Магнитные вклады в $C[p]$ выделялись с учетом решеточного вклада $La[3]RuO[7]$. Вырожденное состояние иона $Gd\{3+\}$ $\{8\}S[7/2]$ не расщепляется в низкосимметричном кристаллическом поле и вклад $S[магн]=R\ln 8$, вклад упорядочения ионов $Ru\{5+\}$ равен $R\ln 2$. Теоретическое значение магнитной энтропии $3R\ln 8 + R\ln 2 = 57,2$ Дж/(моль*К) хорошо совпадает с $S[эксп]=56$ Дж/(моль*К). Ионы $Gd\{3+\}$ упорядочены ниже 9.5 К. Однако $S[эксп]=25$ Дж/(мо для $Pr[3]RuO[7]$ намного выше вычисленного значения 11,52 Дж/(моль*К) для $Ru\{5+\}$, что указывает на упорядочение магнитных моментов ионов $Pr\{3+\}$ и $Ru\{5+\}$.
