The $NdT_{1-x}Ge_xIn$ (T = Rh, Pd) systems

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The NdT_{1-x}Ge$_x$In (T = Rh, Pd) systems

- ✓ The NdT_{1-x}Ge$_x$In (T = Rh, Pd, x = 0÷1) systems were investigated by X-ray powder diffraction (Fig. 1) and energy dispersive X-ray analysis.
- ✓ Samples were synthesized by arc-melting and subsequent annealing at 870 K for one month.
- ✓ Phase analysis was made by means of X-ray powder diffraction (Enraf-Nonius FR552, STOE Stadi P, Cu $K\alpha_1$–radiation) and energy dispersive X-ray analysis (REMMA-102-02 scanning electron microscope).
- ✓ Single crystals were grown using special thermal mode (STOE IPDS II diffractometer, Mo $K\alpha$-radiation).

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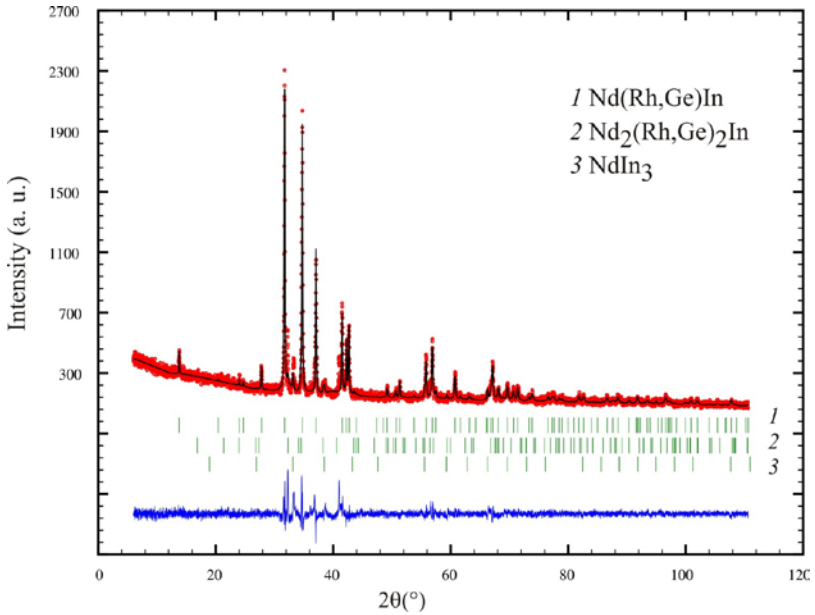

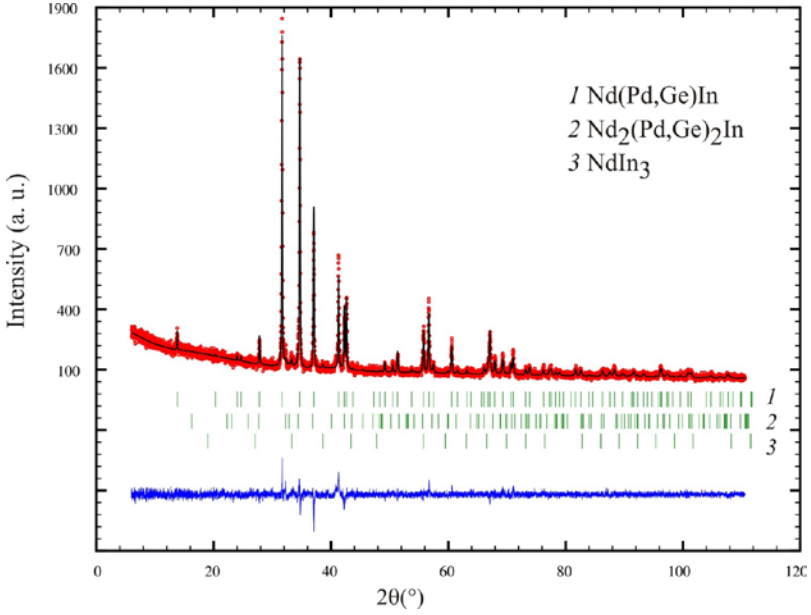

$NdRh_{0.5}Ge_{0.5}In$

$NdPd_{0.5}Ge_{0.5}In$

Fig. 1. X-ray diffraction patterns of samples.

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The limited solubility of Germanium in the NdRhIn and NdPdIn compounds and the existence of solid solutions with the ZrNiAl-type structure (space group *P*-62*m*) [1] were observed (Fig. 2).

The unit cell parameters for solid solutions were calculated [2]:

$NdRh_{1-0.5}Ge_{0-0.5}In$: $a = 0.7534–0.73139(7)$, $c = 0.4028–0.42944(4)$ nm,

$NdPd_{1-0.5}Ge_{0-0.5}In$: $a = 0.76825–0.73367(6)$, $c = 0.40054–0.43309(4)$ nm.

[1] P. I.Krypyakevych, V. Ya. Markiv, E. V. Mel'nyk, *Dopov. ANURSR, Ser. A.* (1967) 750-753.
[2] J. Rodríguez-Carvajal, *Commission on Powder Diffraction (IUCr). Newsletter,* 26 (2001) 12-19.

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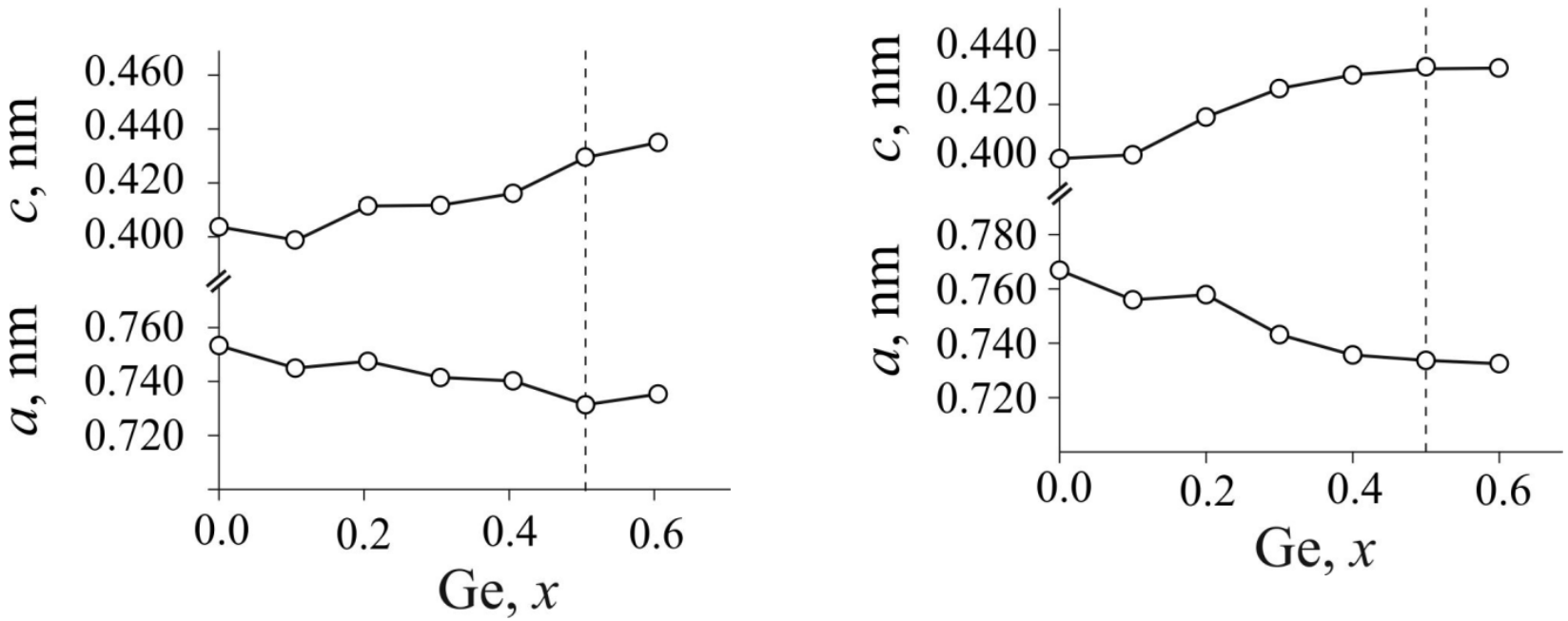

$NdRh_{1-x}Ge_xIn$ $NdPd_{1-x}Ge_xIn$

Fig. 2. Change of unit cell parameters in solid solutions

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The results of partial substitution of Rh atoms by Ge atoms were confirmed by single crystal X-ray analysis. The structure was solved and refined using programs from the SHELX-97 package [3].

$NdRh_{0.7}Ge_{0.3}In$ compound crystallizes with ZrNiAl-type structure (*P*-62*m*, *hP*9, a = 0.74755(11), c = 0.41886(8) nm, $R1$ = 0.0183 for 360 F^2 values, 16 variables, Table), which agrees well with the results of phase analysis and EDX data (JEOL 5900LV scanning electron microscope).

[3] G.M. Sheldrick, *Acta Crystallogr. A.*, A64 (2008), 112-122.

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Atomic and thermal displacement parameters of $NdRh_{0.7}Ge_{0.3}In$ structure

Atom	Wyckoff position	x	y	z	U_{eq}
Nd	*3f*	0.58960(7)	0	0	0.0130(1)
In	3*g*	0.24508(7)	0	1/2	0.0127(1)
Rh	1*a*	0	0	0	0.0145(2)
M	2*d*	1/3	2/3	1/2	0.0123(4)
M = 0.45(3) Ge + 0.55(3) Rh					

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