

## NONSTOICHIOMETRIC OXIDE FORMATION IN SYSTEM Nd-Ni-O.

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The non-stoichiometric compositions  $\text{Nd}_{2-x}\text{NiO}_{4-3x/2+\delta}$  were obtained using coprecipitation method from nitrates solutions by  $\text{K}_2\text{CO}_3$  followed by calcination of the obtained blend at  $900^\circ\text{C}$  (10 hours). It was found that full coprecipitation of ions begins at mole ratio of coprecipitated ions to precipitator  $n=1,75$  in range  $\text{pH}=10-10,2$ .

The thermogravimetric investigations established that coprecipitated carbonates decompose in the four stages.

The first – ( $25 - 392^\circ\text{C}$ ), removing of crystallisation and adsorbed water evaporation. The second - ( $392 - 520^\circ\text{C}$ ),  $\text{OH}^-$  - groupes decomposition. The third ( $622 - 720^\circ\text{C}$ ), carbonates groupes decomposition. At  $850^\circ\text{C}$  - neodymium nickelate phases formation.

According to X-ray phase analysis  $\text{Nd}_2\text{NiO}_{4.392(5)}$  consists of orthorhombic neodymium nickelate and a small of  $\text{Nd}_2\text{O}_3$  impurity (specific reflex at  $d=0,3026\text{ nm}$ ).

$\text{Nd}_2\text{NiO}_{4.392(5)}$  unit cell parameters -  $a=0,545(0)\text{nm}$ ,  $b=0,536(8)\text{ nm}$ ,  $c=0,123(3)\text{nm}$ , space group Bmab.

Samples  $\text{Nd}_{1.9}\text{NiO}_{4.113(5)}$  and  $\text{Nd}_{1.8}\text{NiO}_{4.006(5)}$  consist of non-stoichiometric phase  $\text{Nd}_{2-x}\text{NiO}_{4+\delta}$  with neodymium ions deficient in sublattice.

The orthorhombic unit cell parameters for  $\text{Nd}_{1.9}\text{NiO}_{4.113(5)}$  -  $a=0,541(9)\text{ nm}$ ,  $b=0,535(4)\text{ nm}$ ,  $c=0,123(2)\text{ nm}$ ,  $\text{Nd}_{1.8}\text{NiO}_{4.006(5)}$  -  $a=0,541(5)\text{ nm}$ ,  $b=0,535(4)\text{ nm}$ ,  $c=0,123(2)\text{ nm}$ .

The stabilization of non-stoichiometric neodymium nickelate phases likely is due to ion vacancies formation.

$\text{Nd}_{2-x}\text{NiO}_{4-3x/2+\delta}$  samples with  $0,2 < x \leq 0,5$  are polyphase and contain  $\text{Nd}_2\text{NiO}_4$ ,  $\text{NiO}$  and  $\text{Nd}_2\text{O}_3$ . It was not observed  $\text{Nd}_3\text{Ni}_2\text{O}_7$  phase formation in our experimental conditions.