## ELECTROCHEMICAL HYDROGENATION OF THE $Y_2Ni_{17}$:$Li_x$,$Mg_y$ ALLOY

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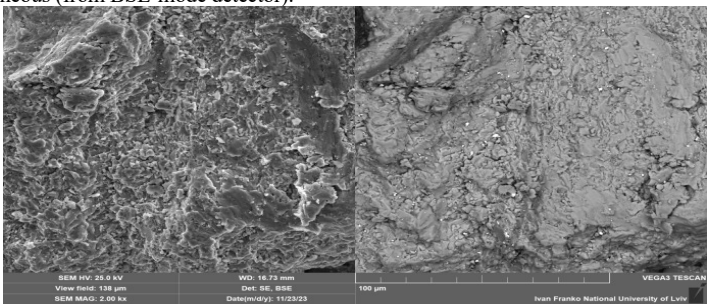
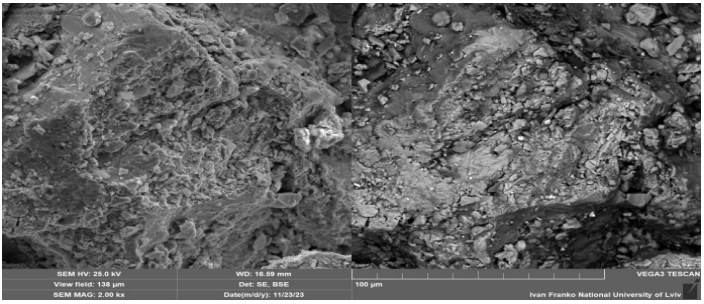
$R_2M_{17}$ multicomponent intermetallics are the base of numerous functional materials. Many compounds with the 2:17 stoichiometry crystallize in $Th_2Ni_{17}$ and $Th_2Zn_{17}$ structure types, that are derivatives from $CaCu_5$-type structure. All these phases are interesting as promising magnetic and hydrogen-sorption materials.

Sample with the nominal composition $Y_{10.5}Ni_{83.5}Li_3Mg_3$ was synthesized by arc-melting, than remelted several times for better homogenization. X-ray phase analysis and scanning electron microscopy showed that the alloy consisted of two phases: the $Tb_2Ni_{17}$:$Li_x$,$Mg_y$ (space group $P6_3/mmc$) main phase and minor amount of Ni (space group $Fm\text{-}3m$). Energy dispersive X-ray spectroscopy (Tescan VEGA3 LMU microscope, EDX-analyzer with X-Max$^N$20 detector) confirmed the formation of these phases. Electrochemical hydrogenation of the studied alloy was carried out in Swagelok-type battery prototype using alkaline solution of 6 M KOH as electrolyte. Under experimental conditions we obtained hydride with H-content ~2.15 H/f.u. Cell parameters of quaternary phase $Y_{2-2x}Ni_{17-2y}Li_{x+y}Mg_{x+y}$ before hydrogenation were: $a$ = 8.3162(8) Å, $c$ = 8.0534(10) Å, $V$ = 482.35(8) Å$^3$. Cell parameters isotropically increased after H-insertion. Composition of electrode material from EDX-analysis before and after hydrogenation was $Y_{10.1}Ni_{85.8}Mg_{4.1}$ and $Y_{9.5}Ni_{86.9}Mg_{3.6}$, respectively. After hydrogenation we observed reduced grains size and significantly etched surface (Fig.). The elemental distribution on the surface was homogeneous (from BSE-mode detector).




*a*




*b*

Fig. SEM-images of $Y_{2-2x}Ni_{17-2y}Li_{x+y}Mg_{x+y}$ before (*a*) and after hydrogenation (*b*)

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