# Complex hydrides $Mg_2(Fe,Co)H_y$ for hydrogen storage materials

Baum L.A.[(1)], Meyer M.[(2)], Mendoza Zélis L.[(3)]

[(1)] IFLP, Departamento de Física, Facultad de Ciencias Exactas, UNLP, calle 49 y 115, 1900 La Plata, Argentina, baum@fisica.unlp.edu.ar
[(2)] IFLP, Departamento de Física, Facultad de Ciencias Exactas, UNLP, calle 49 y 115, 1900 La Plata, Argentina, meyer@fisica.unlp.edu.ar
[(3)] IFLP, Departamento de Física, Facultad de Ciencias Exactas, UNLP, calle 49 y 115, 1900 La Plata, Argentina, mendoza@fisica.unlp.edu.ar

Keywords: complex hydrides, reactive milling, hydrogen storage

Mg-based ternary hydride complexes and transition metal type $Mg_2TH_y$ are very attractive materials for hydrogen storage due to its high volumetric capacity: up to 150 $kgH_2/m^3$ in $Mg_2FeH_6$. They form complex anions $[THY]^{-4}$ leading to ionic-covalent bonds to hydrogen and thus have high enthalpies of dissociation. These compounds can be obtained by sintering at high temperatures and high pressures of hydrogen and in the last decade have achieved remarkable improvements in the yield of the synthesis from mechanically alloyed in hydrogen atmosphere constituents. This technique has also allowed us to explore the synthesis of complex quaternary $Mg_2T_{1-z}T'_zH_y$ combining two transition metals towards optimizing the properties of the resulting hydride.
In this paper we discuss the collection of family compounds $Mg_2Fe_{1-z}Co_zH_y$ ($0 \leq z \leq 1$) via mechanical milling in hydrogen atmosphere at room temperature and its properties as hydrogen storage materials. From mixtures of Mg, Fe and Co in appropriate quantities and at a pressure of 0.3 MPa of $H_2$, we study the progress of the synthesis mechanism through analysing the kinetic curves of hydrogen absorption. Samples taken after reaching a final steady state and representative intermediate stages were characterized by X-ray diffraction, differential calorimetry and Mössbauer spectroscopy. The hydrogen sorption properties of some of them were analyzed in a volumetric equipment. Finally we discuss the different steps in the synthesis of these hydride complex mechanical and thermal properties of hydrogen sorption of the resulting phases, depending on the composition of them.