PCT isotherms of Mg-Ni-Cu mixtures prepared by reactive mechanical grinding

Introduction: Mechanical grinding is a common technique to synthesize nanosized-particles samples with a fixed chemical composition. In the hydride research area, these powders are used as a media for hydrogen storage. One of the main criteria for the characterization of the potential interest in solid hydrogen storage is the measure of PCT isotherms. In this example, the PCTPro-2000 is employed to measure the isotherms of Mg-based systems.

Results
The results show that the hydrogen sorption behaviour of the obtained samples is dependent on the composition. In one case (fig. 1a) only two plateaus can be distinguished, while in another case (fig. 1b) three plateaus are visible. It is related with the different chemical species available for the reaction with hydrogen.

Conclusion
The PCTPro-2000 is a powerful tool to characterize hydrogen sorption properties of ball-milled samples.

Experimental
Approximately 1 g of mixture was charged in the HT sample holder of the PCTPro-2000. Subsequently, hydrogen soak/release cycles to activate and charge the sample were carried out. Then PCT desorption isotherms at 350 °C were recorded for different sample compositions.

Fig. 1: PCT desorption curve recorded at 350°C: (a.) for 16 h BM Mg₈₀Ni₁₀Cu₁₀ and (b.) 16 h BM Mg₅₀Ni₃₀Cu₂₀.