

Low-Temperature Hydrogenation of Mg-Alloy Processed by HPT

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Introduction

Hydrogen is the ideal carrier of clean energy. There are different ways to store it, and metal hydrides are promising candidates, a good option is the MgH_2 .

Metallic hydride for hydrogen storage

MgH₂ has theoretical capacity near to 7.6 wt.%

ADVANTAGES

- High capacity
- Light weight
- Reversible reactions
- Environmentally friendly

Improvements

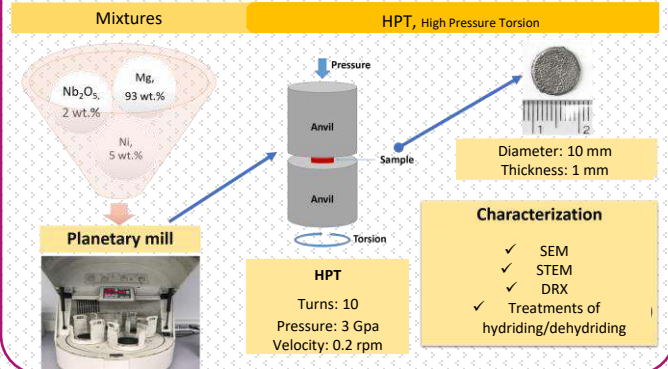
- o Addition of catalysts
- o Bulk nanostructured materials

DISADVANTAGES

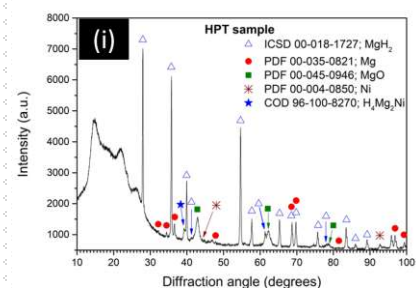
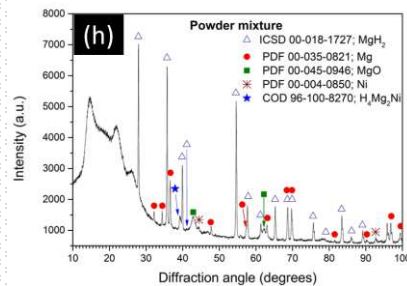
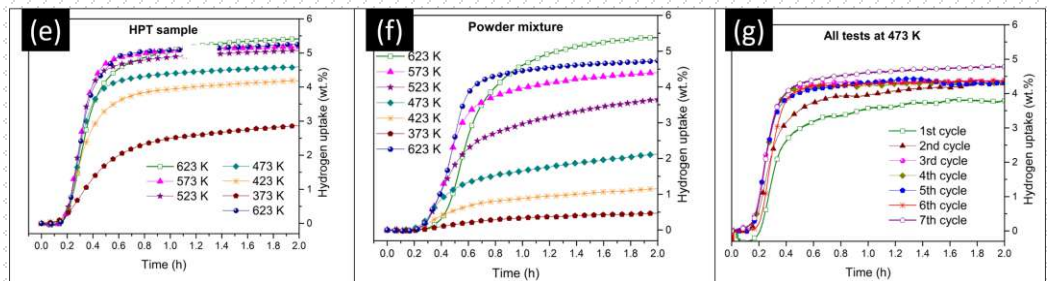
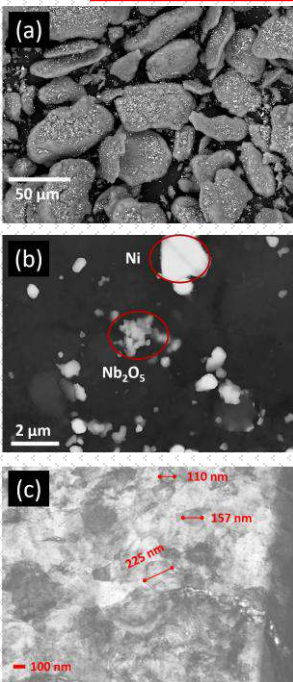
- High temperatures for Hydrogenation/dehydrogenation process
- Slow kinetics
- Reactivity with water and oxygen



Methods and Materials



RESULTS



CONCLUSIONS

- The alloys processed with HPT show an improvement in hydrogenation kinetics compared to the initial powder mixes.
- Hydrogenation at temperatures as low as 100 °C has been recorded for the massive nanostructured magnesium alloys under study.
- The hydrogen storage capacity varied with the hydrogenation temperature reproducibly.
- As a result, a considerable amount of MgO was found in HPT-processed material after several (de)hydrogenation cycles, which explains the lower-than-expected hydrogen capacity achieved.

Acknowledgements

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