Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Enhanced Hydrogen Storage Properties of Magnesium Nanotrees by Glancing Angle Deposition MEHMET CANSIZOGLU, TANSEL KARABACAK, Department of Applied Science, University of Arkansas at Little Rock, Little Rock, AR, 72204 — Magnesium has a high hydrogen storage capacity of 7.6 wt %. In addition it is one of the most abundant low cost materials in nature. However, absorption/desorption of hydrogen in Mg mainly suffer from slow kinetics. In this study, we investigate the hydrogen storage properties of Mg "nanotrees with nanoleaves" fabricated by glancing angle deposition (GLAD) method and compare to those of conventional thin films of Mg. A recently developed quartz crystal microbalance (QCM) gas absorption/desorption technique was used for hydrogen storage measurements on our thin film and nanostructured coatings. Storage experiments were performed at temperatures between 100-300 °C, and at 30 bars of H_2 pressure. Our results reveal that Mg nanotrees have significantly faster kinetics and lower absorption temperatures for hydrogen storage compared to Mg thin films. The enhancement in absorption properties is believed to be due to decreased diffusion lengths, favorable crystal orientations for diffusion of hydrogen, and resistance to surface oxidation of Mg nanotrees.

Mehmet Cansizoglu
Department of Applied Science,
University of Arkansas at Little Rock, Little Rock, AR, 72204

Date submitted: 29 Nov 2010 Electronic form version 1.4