Hydrogenography of Mg-Al-H and optimisation of H-absorption catalysts

R. Griessen

**Faculty of Sciences, Division of Physics and Astronomy,
Vrije Universiteit, Amsterdam, The Netherlands**

Hydrogenography is a novel technique that exploits the optical changes induced by hydrogen absorption in metal films. Hydrogenography on thin films with a compositional gradient has the great advantage that it makes it possible to measure simultaneously a huge number of samples of different elemental compositions on only one wafer (each pixel of the recording camera corresponds essentially to one alloy composition). This enormously facilitates the search for new (complex) hydrides. The compositional gradient thin films necessary for hydrogenography are synthesised by co-sputtering from three off-centred magnetron sources. The (complex) hydride formation during ex-situ hydrogen exposition at well-defined temperatures and hydrogen gas pressures is monitored by the transparency of the films. Since all complex hydrides found so fare have an electronic band gap their transparency is a good indicator of the amount of absorbed hydrogen. Hydrogenography is thus applicable to a large class of potential light-weight hydrogen storage materials.

In the first part of my talk I present new data on the Mg-Al-H system, in particular about the absorption of hydrogen in Mg-Al alloys, its kinetics and the concomitant changes in optical reflection and transmission. The results obtained so far indicate that films with [Al]/[Mg]=2 are partially transformed to $Mg(AlH_4)_2$.

In the second part I show how switchable mirrors can be used to investigate the catalytic properties of transition metal films (Pd, Pt, Ni, Co, Ag, Pd-Ag) and (NbO_x) for hydrogen absorption.