

# X-Ray Photoelectron Spectroscopy Investigation of Sequentially Sputtered Magnesium-Carbon Thin Films

Anna-Karin Eriksson, Árni Sigurður Ingason, Sveinn Ólafsson  
annakarin@raunvis.hi.is  
Science Institute, University of Iceland,  
Dunhaga 3, IS-107 Reykjavik,  
Iceland

## Abstract

Ball milling magnesium (Mg) and graphite (G) with organic additives (such as benzene) has proven to improve the hydrogen uptake and kinetics, compared to pure Mg and Mg mixed with just G [1]. The change in the surface properties and a shift in the binding energy of the 2p level in Mg due to the presence of carbon has been postulated to be two of the reasons for the increased kinetics. This was however opposed by Bobet et. al. [2], who claimed that the shift was due to surface oxides and not presence of carbon. To investigate this further, a sequentially sputtered magnesium-carbon thin film, 700Å thick was grown on top of a 4000 Å thick layer of Mg and then covered with palladium. The chemical composition with depth was investigated using Rutherford Backscattering (RBS). The top layer contained  $Mg_{0.7}C_{0.3}$  and throughout the film approximately 10% of oxygen was found. The binding energies of the Mg 2p and C 1s peaks were investigated using X-Ray Photoelectron Spectroscopy (XPS) measurements. A depth profile could be obtained using an argon sputtering gun which removed the top layers after each measuring cycle. A correlation between the presence of carbon and a shift of the Mg 2p peak was observed.

## References

- [1] H. Imamura et. al. J. Alloy Comp. **293-295** pp. 564 (1999).
- [2] J. -L. Bobet et. al. J. Alloy Comp. **366** pp. 298 (2004).