Prof. Dr. R.J. Behm
Inst. für Oberflächenchemie und Katalyse
Universität Ulm

Master Thesis	**Growth of Mg Model Electrodes and their Interaction with Ionic Liquids**
Work Description:	Rechargeable Magnesium-air batteries are attractive systems for electrochemical energy storage due to their high theoretical energy density. A crucial aspect for their function and performance is the electrode|electrolyte interface. Our work aims at a molecular scale understanding of the processes at this interface by using structurally well-defined model systems and studying their interaction with battery relevant solvents/electrolytes under ultrahigh vacuum (UHV) conditions, employing highly sensitive surface science techniques such as scanning tunnelling microscopy (STM) and X-ray photoelectron spectroscopy (XPS). The present thesis focuses on the first steps, the preparation of structurally well-defined Mg films and their interaction with an ionic liquid (IL) as model solvent. The student will systematically investigate the growth of thin Mg films, which are deposited from an electron beam evaporator on a graphite (HOPG) substrate, both by STM and by XPS, aiming at flat, clean Mg surfaces. Second, he/she will explore the temperature dependent interaction of this film with a battery relevant IL solvent, which is vapor deposited on the Mg film, employing the same techniques. This will gain information on the structural arrangement of the adsorbed IL species, their chemical stability and, possibly, their thermal decomposition, providing valuable insight on the reactive processes at the electrode|electrolyte interface at a molecular scale. In this work the student will learn to handle modern surface science tools including high resolution STM, and acquire in depth knowledge of modern concepts in fundamental battery research.
Target group:	Chemistry / Physics / Advanced Materials Master students
Financial support:	Up to 35 hours per month in Hiwi jobs possible (ca. 350,- € / month)
Contact:	Dr. Florian Buchner, Uni West, Zi 47.2.211, Tel. (0731)-50-25469; florian-1.buchner@uni-ulm.de; http://www.hiu.kit.edu/english/68.php Maral Bozorgchenani, Uni West, Zi 47.1.211.2, Tel. (0731)-50-25458; Maral.bozorgchenani@uni-ulm.de; http://www.uni-ulm.de/iok/
Comment:	The work is part of our activities in the Helmholtz Institute Ulm (HIU).