

## Physics Seminar

Tuesday, October 11<sup>th</sup>, 2011 at 16h15

(coffee at 16h00)

Campus Belval  
Room F011

Talk by **Dr. Daniel Abou-Ras**

Helmholtz-Zentrum Berlin für Materialien und Energie Institute of Technology

### Structural, compositional and electrical analyses of grain boundaries in Cu(In,Ga)Se<sub>2</sub> thin films by electron microscopy

Cu(In,Ga)Se<sub>2</sub> thin-film solar cells with ZnO/CdS/Cu(In,Ga)Se<sub>2</sub>/Mo/glass stacks exhibit power-conversion efficiencies of more than 20 %. It is a long-standing question how such good photovoltaic performances are possible in view of the large density of grain boundaries in the Cu(In,Ga)Se<sub>2</sub> absorber layer. The presentation will give a short summary of existing models and literature, as well as details on structural, compositional and electrical properties of these grain boundaries, determined at down to subnanometer scales, which give possible answers to this question. It will be shown that a non-twin boundary in Cu(In,Ga)Se<sub>2</sub> can be considered an electrostatically strongly confined and chemically flexible region of about 1-2 nm in width. This grain-boundary model can be related to the view of relaxed atomic lattices at grain boundaries with low densities of deep defect levels in the band gap and therefore only slightly enhanced recombination velocities at grain boundaries, as compared with grain interiors.

#### Next Physics Seminars

- Tuesday, 25<sup>th</sup> October 2011  
Limperstberg, 16h15  
Speaker and topic to be confirmed later
- Friday, 28<sup>th</sup> October 2011  
Belval, 10h00  
Dr. Prof. Roland Scheer  
*Recombination mechanisms in CIGS solar cells*
- Tuesday, 8<sup>th</sup> November 2011  
Limperstberg, 16h15  
Prof. Claude Lecomte
- Tuesday, 22<sup>nd</sup> November 2011  
Belval, 16h15  
Dr. Elisabeth Chassaing  
*Challenges in electrodeposition for photovoltaic applications*
- Tuesday, 13<sup>th</sup> December 2011  
Belval, 16h15  
Prof. Christian Wagner