

Physics seminar

Tuesday, 5th October 2010 at 16h15

(coffee at 16h00)

Laboratory for Photovoltaics
41 rue du Brill, L-4422 Belvaux
Room F0. 1-1

Katja Hönes

PhD student at the Laboratory of Photovoltaics

“Photoluminescence of a new solar cell material: kesterites”

The kesterites $\text{Cu}_2\text{ZnSnS}_4$ and $\text{Cu}_2\text{ZnSnSe}_4$ are promising new materials for solar cells. They can be derived from the thin film solar cell materials CuInSe_2 and CuGaSe_2 by substituting the group III element, In or Ga, by two elements, Zn and Sn, of the second and fourth group of the periodic system. In doing so, the band structure is expected to stay similar to the chalcopyrite material, leading to similar band gaps and absorption coefficients, but Sn and Zn have the advantage to be more abundant than In and Ga in the Earth's crust, and therefore will be cheaper. For $\text{Cu}_2\text{ZnSnS}_4$ and $\text{Cu}_2\text{ZnSnSe}_4$ band gaps of 1.5eV and 0.9eV are reported.

Synthesizing a quaternary compound, additional secondary and ternary phases become an important issue. Especially as the composition range, in which only kesterite forms, is reported to be small. In the presentation the possible secondary and ternary phases will be introduced. Subsequently photoluminescence and X-ray diffraction results will be presented and their strengths and limits in the identification of secondary and ternary phases will be discussed. As kesterite is expected to be, similar to the chalcopyrites, a natively doped semiconductor, the defects will play a crucial role for the device properties. Therefore, in the second part of the talk photoluminescence results on defects in kesterites, measured on kesterite crystals, will be presented. For the first time an exciton has been observed in a kesterite crystal.

Next Physics Seminars

- **Tuesday, 19th October :**
at Limpertsberg, 16:15 **Simon WILLIAMS, Proudman Oceanographic Laboratory**
Topic will be announced shortly
- **Tuesday, 2d November :**
in Belval , 16:15 **Ulrich MÜLLER, Post-doc at the Laboratory of Physics and Material Research**
“Temperature modulated refractometry: a novel access to structural evolution in isotropic media”
- **Tuesday, 16th November :**
at Limpertsberg, 16:15 **Dr. Rosalind Allen, the University of Edinburg**
“Modelling the growth of bacterial populations in changing environments”
- **Tuesday, 30th November :**
in Belval, 16:15 speaker and topic will be announced shortly
- **Tuesday, 14th December :**
at Limpertsberg, 16:15 speaker and topic will be announced shortly