

Physics seminar

Tuesday, 11th January 2011 at 16h15

(coffee at 16h00)

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

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“Synthesis of CuInSe_2 thin film solar cells from electrodeposited binary selenide stacks”

$\text{CuIn}_x\text{Ga}_{1-x}\text{Se}_2$ (CIGS) is an outstanding semiconductor for the fabrication of solar cells since it combines a high efficiency similar to crystalline silicon solar cells with the advantages of thin film technology, as low energy and material consumption in the fabrication process. Compared to physical vapor deposition (PVD) which is the state of the art for CIGS world record cells electrodeposition offers advantages like low-cost equipment and easy upscaling of processes. However the efficiency of electrodeposited CIGS solar cells (world record 13.8%) still lacks behind the record efficiency of PVD solar cells (20.3%) which shows the necessity for further research in this area.

In this work a synthesis route for CuInSe_2 (CIS) thin films by the annealing of electrodeposited indium selenide / copper selenide stacks is presented. In a first step the electrodeposition of indium selenide and its related electrochemistry are discussed followed by the electrodeposition of copper selenide. A special focus has been the electrodeposition of layers which are uniform in composition.

The reaction mechanisms of this In-Se/Cu-Se stack have been studied by X-ray diffraction (XRD). The crystallization of the film and its dependence on the annealing parameters has been shown in scanning electron microscopy (SEM).

Latest results of solar cells are presented and an outlook on possible future projects is given.

Next Physics Seminar

- Tuesday, 25th Jan. 2011 : Prof. Dr.-Ing. Heike Emmerich,
Campus Limpertsberg, 16:15 Lehrstuhl Material-und Prozesssimulation Universität Bayreuth
“Phasenfeldsimulation”