PRESS RELEASE

ILGAR achieve efficency record

HZB-scientists have received simultaneous confirmation of two records in efficiency levels for CIS thin film solar-modules.

The demand for renewable energy is increasing – climate change and the atomic-energy crisis are propelling development. Within the photo-voltaic market, CIS (copper indium selenide) thin film solar-modules are playing an increasingly significant role. Semiconductors are inserted into them (most-commonly copper compounds, so-called "chalcopyrite"), in order to achieve electric current from sunlight. The Institute "Heterogeneous Materials Systems" of the Helmholtz-Zentrum Berlin (HZB) has received simultaneous confirmation of two records in efficiency levels for such solar cells from the independent Institute for Solar Energy Systems (ISE) in Freiburg. The unique thing about this innovation is that the so-called "buffer layer" of solar cells originated from the environmentally-friendly production procedure ILGAR developed at HZB. The heavy metal cadmium, typically used in this technology, is not deployed here.

Berlin, 27.2.2012

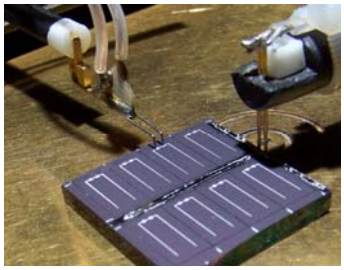
Further information:

Prof. Dr. C.-H. Fischer
Institut für heterogene Materialsysteme
Tel.: +49 (0)30-8062-42017
fischer@helmholtz-berlin.de

Press Office
Hannes Schlender
Tel.: +49 (0)30-8062-42414
Fax: +49 (0)30-8062-42998
hannes.schlender@helmholtz-berlin.de

Dr. Ina Helms
Tel.: +49 (0)30-8062-42034
ina.helms@helmholtz-berlin.de

There are in existence technologically low-priced production processes for all components of thin film solar modules – however, for the buffer layer this was, until only recently, not the case. The standard material for these components is the toxic cadmium-sulphide. The ILGAR procedure (Ion Layer Gas Reaction) developed at HZB provided a remedy in this regard; with the aid thereof, semiconductors of highest quality for thin film solar cells can be produced in standardised processes. The buffer layers of indium-sulphide or zinc-sulphide/indium-sulphide produced hereby are able to replace the toxic cadmium in thin film solar cells. ILGAR renders a deposition technique superfluous – the procedure known as "chemical bath deposition", which is considered slow and harmful to the environment.



A chalcopyrite thin-layer solar-cell at the sun-simulator test stand.
Photo: ©HZB

To generate their record-breaking cells, HZB scientists used absorbers (i.e. light-absorbing layers), which are deployed as a standard in the industry. Two solar-cell efficiency levels were thereby confirmed in this context. 16.1 percent were achieved for cells that were produced with ILGAR indium-sulphide buffer layers (In_2S_3) based on CIS Tech $Cu(In,Ga)(S,Se)_2$ absorbers (in-house measurements of 16.8% right after production). The HZB scientist Johanna Krammer was responsible for the buffer, for which she was able to access comprehensive preliminary work by the ILGAR Group. From the Bosch Firm, Dr. A. Jasenek and Dr. F. Hergert are to be commended for their exemplary support.

Based on cells with absorbers from the AVANCIS Firm, the scientists were able to confirm in the context of their own measurements cell efficiency levels of 16.4 percent. In collaboration with the mechanical engineer firm Singulus-Stangl Solar, an industrial prototype of an ILGAR in-line laminator was developed. Within HZB, In_2S_3 buffers with a velocity of 10 millimetres per second were isolated. The resulting 30x30 square centimetre solar modules on the basis of AVANCIS absorber layers indicated, with 13.7 percent, an equivalent efficiency level compared to that of cadmium-sulphide buffered reference modules.

The ILGAR team, led by Professor Dr. Christian-Herbert Fischer, was awarded in June 2011 at the Clean Technology Conference & Expo in Boston, USA for their patented ILGAR procedure as one of four GERMAN HIGH TECH CHAMPIONS in the competition sponsored by the Fraunhofer Society.

The **Helmholtz-Zentrum Berlin für Materialien und Energie (HZB)** operates and develops large scale facilities for research with photons (synchrotron beams) and neutrons. The experimental facilities, some of which are unique, are used annually by more than 2,500 guest researchers from universities and other research organisations worldwide. Above all, HZB is known for the unique sample environments that can be created (high magnetic fields, low temperatures). HZB conducts materials research on themes that especially benefit from and are suited to large scale facilities. Research topics include magnetic materials and functional materials. In the research focus area of solar energy, the development of thin film solar cells is a priority, whilst chemical fuels from sunlight are also a vital research theme. HZB has approx.1,100 employees of whom some 800 work on the Lise-Meitner Campus in Wannsee and 300 on the Wilhelm-Conrad-Röntgen Campus in Adlershof.

HZB is a member of the Helmholtz Association of German Research Centres, the largest scientific organisation in Germany.