22nd European Photovoltaic Solar Energy Conference and Exhibition (EU-PVSEC) Milan, Italy, September 2007

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The Conference

EU-PVSEC is the world's largest specialist conference in the photovoltaic solar energy sector, and was attended by 3000 scientists, industrial representatives and politicians from 83 countries. It covers all areas of modern solar energy generation. In parallel to the conference, the event hosted the world's largest photovoltaic trade exhibition, and the 520 exhibitors attracted around 12000 visitors.[1]

Presentations

Imperial College gave a number of oral and visual presentations at this conference, including my talk, entitled "Quantitative Study of Hot Carrier Effects observed in Strain-Balanced Quantum Well Solar Cells", which showed evidence for increased carrier temperature in the quantum well region of gallium arsenide based quantum well solar cells.

The conference covered a wide range of subject areas. Some examples are given below.

T. Trupke

University of New South Wales, Sydney, 2052, NSW, Australia

"Progress With Luminescence Imaging for the Characterisation of Silicon Wafers and Solar Cells" (Plenary)

Electroluminescence (EL, luminescence from electric bias) and photoluminescence (PL, luminescence from light bias) can be used to gather information about the spatial distribution of various processes in silicon solar cells in a very short time. This paper reviews various specialised applications of luminescence imaging in the silicon industry, specifically on large-area samples. It discusses the rapid imaging of minority carrier lifetimes, diffusion lengths, series resistance, shunts, iron impurities, dislocations and cracks. There are numerous advantages to using luminescence techniques over more conventional methods. An example given compares two minority carrier lifetime maps of a large area wafer, the first from a 100 second microwave photoconductance decay measurement, and the second from a 1 second PL measurement. The PL image's spatial resolution was better by one order of magnitude, and the measurement time sufficiently low to make this measurement suitable for process monitoring. Another example compared series resistance maps from a destructive 40 minute CORESCAN measurement to a non-destructive second PL measurement, and found a much better spatial resolution in the PL approach, again demonstrating the use of this method for in-line monitoring. Another in-line application of luminescence imaging is the localisation of shunts, which allows the shunts to be isolated, in effect repairing the cell.

1) source: 22md EU-PVSEC at one glance http://www.photovoltaic-conference.com/246.0.html

Gavin Conibeer
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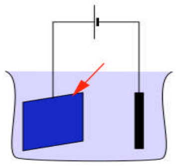
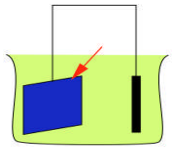
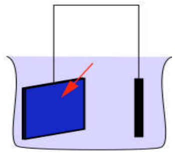
"Tandem Photoelectrolysis Cells for direct water splitting"



(a)

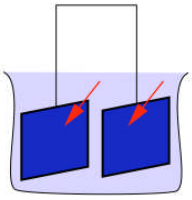


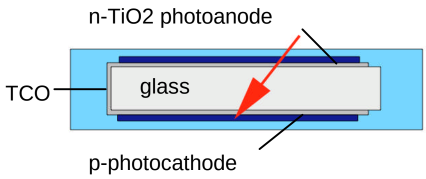
(b)



(c)

It is possible to split water into oxygen and hydrogen gas by immersing solar cells of sufficient voltage directly in water, and using one or more surfaces as electrodes for electrolysis. In order to directly split water using photovoltaics, the cells' voltage must exceed the redox potential of water. This can be achieved in several ways: (a) the potential difference can be boosted with an external bias, as from a battery, (b) with a chemical bias resulting in a forcibly altered pH, and (c) with a cheap and robust tandem photoelectric cell. Anther possibility is to use separate cells as photoanode and photocathode (d). This paper examines the possibility of attaching both photoanode and photocathode onto a glass substrate coated in TCO, resulting in a tandem photoelectrolysis cell (e). Further tests are needed to study the lifetime of this type of cell, as well as the decomposition methods.





(d) (e)

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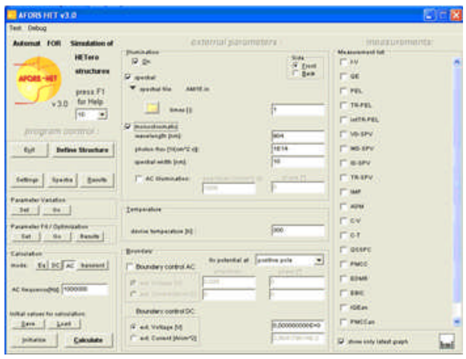
"AFORS-HET 3.0: First Approach to a Two Dimensional Simulation of Solar Cells"



AFORS-HET interface[2]

AFORS-HET is a "numerical computer simulation program for modelling heterojunction solar cells and measurements". Previously a one-dimensional simulation, this paper describes the first steps taken towards making the simulation two dimensional, using two approaches. The first is a 2d-network approach describing majority carrier transport problems only. The second approach considers minority carriers as well by solving the semiconductor equations in two dimensions, although this particular approach is unfinished. The program was demonstrated by simulating a Buried Grid RECASH (Rear Contact Crystalline/Amorphous Silicon Heterojunction) Solar Cell. Afors-Het is available for free download at:

http://www.hmi.de/bereiche/SE/SE1/projects/aSicSi/AFORS-HET/

2) source: Afors-Het interface: http://www.hmi.de/bereiche/SE/SE1/projects/aSicSi/AFORS-HET/diashow.html