Grand Technion Energy Program

תוכנית האנרגיה ע"ש גרנד

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Professor Eicke R. Weber

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Professor Eicke R. Weber is Director of the Fraunhofer Institute for Solar Energy Systems ISE and Professor for Physics/Solar Energy at the Faculty of Mathematics and Physics and at the Faculty of Engineering at the Albert-Ludwigs-University of Freiburg, Germany. The ISE institute is one of the world-leading research institutes in the field of renewable energy and energy efficiency. The focus of Prof. Weber's research is the analysis of lattice defects in Si and compound semiconductors. Recently he studied specifically how good solar cells can be produced out of upgraded metallurgical ("dirty") silicon with high metal content. Prof. Weber studied Physics at the University of Cologne, Germany where he made his doctorate in 1976 and his habilitation in 1983. From 1983-2006 he lectured at the faculty of the Department of Materials Science and Engineering of the University of California, Berkeley - since 1991 as Professor of Materials Science. In 1990 he was appointed visiting professor at the Tohoku University in Sendai, Japan and in 2000 at the Kyoto University in Kyoto, Japan. In 1994 he received an Alexander von Humboldt Senior Scientist Award. From 2004-2006 he served as the chair of the Nanoscale Science and Engineering Graduate Group in Berkeley. He was president of the Alexander von Humboldt Association of America (AvHAA) from 2001-2003 and in 2003 he was elected founding president of the German Scholars Organization (GSO). In 2006 he received the Award of Merit (Bundesverdienstkreuz am Bande) of the German President. He is fellow of the American Physical Society.
In July 2008 Prof. Weber was appointed Director to the SEMI International Board of Directors. He received the Electronics and Photonics Division Award of the Electrochemical Society ECS in June 2009. In October 2009 he was elected Honorary Member of the Ioffe Physical-Technical Institute of the Russian Academy of Sciences, St. Petersburg. Since 2010 Prof. Weber is member of acatech - the German Academy of Science and Engineering, Berlin.

Will lecture on:

Solar Energy as Key Pillar of our Future Renewable Energy Supply

The limitations of fossil energy use and the requirement to reduce emissions of climate-relevant gases result in an urgent need to change our global energy system towards more efficient use of increasingly renewable, climate-neutral forms of energy. Among all kinds of renewable energy, only solar energy is available in virtually limitless quantity. Therefore solar energy will develop to be our dominant energy source, at least in the second half of this century. Solar energy can be harvested by converting solar heat into electricity with a conventional thermal power plant, or by direct conversion in a photovoltaic (PV) cell. Solar thermal electricity production right now is cost competitive with PV power, and offers storage possibilities. The rapid cost reduction of PV through innovation and volume production will give this semiconductor technology a long-term cost advantage.

In recent years, Europe and especially Germany has taken a leading position in research and implementation of PV power. Today's PV market is dominated by solar cells made out of crystalline silicon with solar power conversion efficiencies in the 15-21% range. About 15% of the current PV market are thin film technologies based on amorphous or microcrstalline silicon or SiGe heterostructures, CdTe, or CuIn(Ga)S. Thin-film PV has the lowest cost per installed Watt, with CdTe PV modules soon reaching a price of $1/Wp, but a decisive increase in market share is hampered by the rather low efficiency of these modules in the 8 – 11% range. A third technology that is just entering the market on a large scale is based on high-efficiency III/V multijunction heterostructures. Our Fraunhofer ISE announced last year a world record efficiency of 41.1% (with 400x concentration) using this technology. Organic, or dye-sensitized cells, and PV cells based on nanostrctures as active layer still are limited by very low efficiencies in the 2-5% range, but provide very exciting research topics all over the world.

After summarizing global developments towards the future renewable energy system this talk will focus on discussing recent R&D achievements, especially in the fields of crystalline Si and high-efficiency III-V solar cell technologies.

GTEP

Tuesday, February 8, 2011
at 11:30 a.m.

Wolfso n Department of Chemical Engineering, Hall 1

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