

The Becquerel Prize



The Becquerel Prize

The most prestigious European Prize awarded to those who made major contributions to the science, technology or application of photovoltaic solar electricity

Awarded Personalities from 1989 to 2017

Small technical cover images (from left to right):

a. Detail of the manufacture of wafer based solar cells

b. Organic photovoltaic cell

c. DC/AC inverter for photovoltaic applications

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Introduction from the Chairman of the Becquerel Prize Committee

The Alexandre Edmond Becquerel Prize was established in 1989 by the European Commission at the occasion of the 150th anniversary of Becquerel's classical experiment in which he discovered the photovoltaic effect. Its purpose is to honor scientific, technical or managerial merit in the development of photovoltaic solar energy, attained over a long period of continuous achievements, or very exceptionally, for some extraordinary invention or discovery. It is primarily a European Award but not restricted exclusively to European citizens.

The Becquerel Prize is granted by the European Commission and awarded in the name of the European Photovoltaic Community as a highlight of the Opening Ceremony of the annual European Photovoltaic Solar Energy Conference (EU PVSEC). The Prize is now given for the 24th time.

The submission of proposals for new prize candidates is announced publicly together with the announcement of the EU PVSEC. The Becquerel Prize Committee selects the individual to be honoured with the prize. This committee is formed by all past awardees, the Chairperson of the actual EU PVSEC, one representative of the European Commission and the organizer of the EU PVSEC. The bylaws of the Prize Committee are reproduced at the end of this brochure.

This brochure highlights the prize winners from the years 1989 – 2017. The appraisals of the first years are black-and-white copies from a brochure that was published in 2004. The recognitions for the years 2005 - 2017 comprise besides curricula vitae also excerpts from the official prize diploma.

The spirit of the prize is excellently summarized in the foreword to the 2004 edition of the Becquerel Prize brochure by Prof. Antonio Luque: "I am convinced that the incredible growth of photovoltaics today owes a lot to these committed pioneers that were awarded with this prestigious prize. They stand out as leaders of the European photovoltaic community, in science, in technology, in policy, and also in management of actions that have contributed to this growth. The Becquerel Committee has decided to publish this brochure with their biographies to keep a record of some of the pioneering work – certainly not all, and one has to apologize to all those who may not be awarded with this prize but whose contribution were undeniably of great importance as well – which only made this great endeavour eventually possible. PV for a better future of mankind."

Freiburg, April 2018

Prof. Joachim Luther
Chairman of the Becquerel Prize Committee

Alexandre Edmond Becquerel

The Becquerel Prize is named after Alexandre Edmond Becquerel¹ (24 March 1820 – 11 May 1891). Alexandre Edmond Becquerel was born in Paris and was the assistant and later the successor of his father, Antoine César Becquerel, at the Musée National d'Histoire Naturelle.

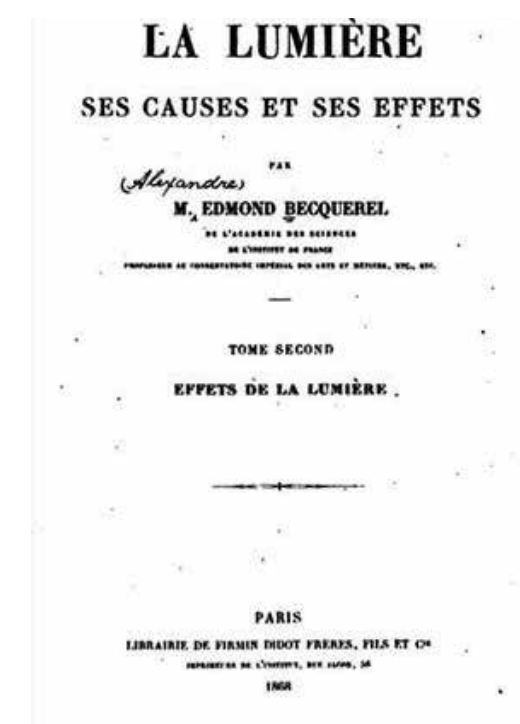
In 1839, at the age of 19, he created and analyzed the world's first photovoltaic cell^{2,3} in the laboratory of his father. The photovoltaic cell consisted of two electrodes in an acidic solution, separated by a thin membrane. He illuminated one of the electrodes. Especially when the electrodes were coated with AgCl or AgBr, he could observe a significant generation of electricity. Since he could exclude that this effect was due to temperature effects (induced by the illumination), he concluded that the light itself was the reason for his observation. Furthermore Becquerel already discovered the influence of the spectrum of light on the photovoltaic effect; he noted that blue light yielded the highest current generation.

Alexandre Edmond Becquerel was also very active in other research related to the effects of light like photography and phosphorescence. In 1867/68 he published the important book: "La lumière, ses causes et ses effets (Light, its causes and effects)".

¹ not to be confused with his son Henri Becquerel who received the Nobel Prize in Physics for the discovery of radioactivity

² A.E. Becquerel, "Recherches sur les effets de la radiation chimique de la lumière solaire au moyen des courants électriques", *Comptes Rendus de L'Académie des Sciences*, Vol. 9, pp. 145-149, 1839; also *Annalen der Physik und Chemie*, Vol. 54, pp. 18-34, 1841.

³ A.E. Becquerel, "Mémoire sur les effets électriques produits sous l'influence des rayons solaires", *Comptes Rendus de L'Académie des Sciences*, Vol. 9, pp. 561- 567, 1839; also *Annalen der Physik und Chemie*, Vol. 54, pp. 35-42, 1841.



Dr. Stefan Nowak

received the Becquerel Prize in honor of his merits in the field of integration of photovoltaic electricity into the future global sustainable energy system. The prize was awarded in 2017 on the occasion of the European Photovoltaic Solar Energy Conference in Amsterdam, The Netherlands.

Dr. Nowak is one of the leading strategists and promoters of targeted European and global co-operation on PV research, market assessment and deployment. Of particular importance are his long-lasting activities as chairman of the International Energy Agency's "Photovoltaic Power Systems Programme" and as coordinator of the "Solar European Research Area Network".

His leadership, comprehensive and precise analyses and inspiring argumentation in strategic and institutional discussions have strongly contributed to the global credibility of photovoltaics as a basis of future energy systems.

Excerpt from the Becquerel Prize diploma 2017



Curriculum vitae

Stefan Nowak is an experimental physicist by training with a PhD from Fribourg University and EPFL, Switzerland, in 1986. In his early academic work, Stefan Nowak specialized in the field of plasma physics, in particular related to thermonuclear fusion research, where his PhD work concentrated on radiation losses in tokamak devices. In the years of his PhD, Stefan Nowak developed his early interest for energy research.

Following his PhD, after a brief activity in the area of radioactivity analysis following the Chernobyl nuclear accident in 1986, Stefan Nowak broadened his research activities to more industrially oriented plasma physics; namely for chemical analysis, surface treatment and analysis as well as thin films. He held a post-doc position at the Technical University of Eindhoven, Netherlands, and subsequently a position as senior research assistant at the University of Fribourg, Switzerland.

During his work at the University of Fribourg, Stefan Nowak developed his interest for industrial research and technology transfer. Besides his position as senior research assistant, Stefan Nowak became head of the industry liaison unit of the University of Fribourg in 1992. In the same period, he was strongly involved in the evaluation of Swiss energy research. As a consequence of this activity, Stefan Nowak was asked to become programme manager of the Swiss federal photovoltaic research programme on behalf of the Federal Office of Energy. As part of this assignment and representing Switzerland, Stefan Nowak became a member of the Executive Committee of the IEA Photovoltaic Power Systems Technology Collaboration Programme (IEA PVPS) in 1996.

Combining his various activities and interests in the field of energy research, innovation, technology management and international cooperation, Stefan Nowak founded NET Nowak Energy & Technology Ltd., a consultancy specialized in renewable energy, energy and resource efficiency, in 1997. Stefan Nowak subsequently broadened his technological expertise with complementary experience in market assessment, communication and policy. In 2001, Stefan Nowak was elected chair of the Executive Committee of the IEA Photovoltaic Power Systems Programme (IEA PVPS). The responsibility for this programme over the past 15 years has led to a large network, numerous contacts, experiences and travels related to PV technology and deployment in all 5 continents.

From 2003 to 2004, Stefan Nowak was a member of the Photovoltaic Technology Research Advisory Council (PV-TRAC) of the European Commission and co-author of the first PV Vision report of this council. He then served as member of the Steering Committee and later vice-chair of the European Photovoltaic Technology Platform, a position that he held until 2013. During this period, Stefan Nowak was also core member and later co-ordinator of various subsequent European Solar Era Net and Solar Era Net Cofund projects, bringing together more than 20 EU ministries and agencies.

Stefan Nowak also leads the Secretariat of the Swiss REPIC platform, a governmental platform of four Swiss government agencies for the promotion of renewable energy, energy and resource efficiency in international cooperation. The REPIC platform aims at supporting projects in the early phase of deployment and the ambition of scale-up, replication and multiplication. Through more than 120 projects worldwide, managed

within this programme over the last 12 years, Stefan Nowak has acquired a unique experience with setting up projects that are aimed at a sustainable deployment and multiplication of clean energy technologies in developing and emerging economies.

In Switzerland, Stefan Nowak is strongly involved in the energy research landscape. Besides his activities as programme manager of the Swiss federal photovoltaic research programme on behalf of the Federal Office of Energy, Stefan Nowak is a member of the Core Evaluation Panel of the Swiss Competence Centers for Energy Research (SCCER) since 2013 and president of this panel since 2017.

Relevant contributions to the photovoltaic sector

- Global analysis of potentials, economics, markets and policies of photovoltaics
- Definition and implementation of national and international photovoltaic research strategies
- Evaluation / review of photovoltaic research projects, programmes and institutions
- Evaluation / review of small to large photovoltaic industrial projects
- Co-author of IEA photovoltaic roadmaps
- Positioning photovoltaics in different IEA publications, e.g. Medium Term Renewable Energy Market Reports, Energy Technology Perspectives, World Energy Outlook
- Raising the global profile of the IEA photovoltaic technology collaboration programme (TCP) IEA PVPS to one of the largest and most successful IEA TCPs
- Regular invited for contributions to international photovoltaic conferences worldwide

Prof. Christophe Ballif

received the Becquerel Prize in honor of his scientific merits in the development of silicon heterojunction solar cells. The prize was awarded in 2016 on the occasion of the European Photovoltaic Solar Energy Conference in Munich, Germany.

Prof. Ballif is one of the pioneers in the development of high efficiency crystalline solar cells with heterojunctions and passivated contacts. His work spans the field from fundamentals to novel manufacturing processes, pilot tools and production lines. His research on tandem solar cells with a focus on silicon/perovskite and silicon/III-V compounds is highly recognized.



Prof. Ballif has published very extensively and is one of the most highly cited researchers in the field of solar cells. His unwavering enthusiasm has energized dozens of PhD students and postdoctoral fellows. His passionate promotion of solar energy technology as the main electricity source for the future has contributed enormously to its acceptance by society.

Excerpt from the Becquerel Prize diploma 2016

Curriculum vitae

Christophe Ballif is currently a professor at the Ecole Polytechnique Fédérale de Lausanne (EPFL), chairing the photovoltaics and thin film electronics laboratory in Neuchâtel. Since 2012 he directs the CSEM PV Center, a non-profit technology organization supporting industrialization.

Christophe Ballif was born near Lausanne, in the Swiss Jura mountains, in 1969. He received both his M.Sc. and Ph.D. degrees in physics from the EPFL, Switzerland in 1994 and 1998 respectively. His work focused on novel photovoltaic materials based on the layered compounds MoS₂ and WS₂. He was then a postdoctoral researcher with the National Renewable Energy Laboratory, Golden, CO, USA where he was involved in the characterization of compound semi-conductor solar cells such as CdTe and CIGS.

He then worked at the Fraunhofer Institute for Solar Energy Systems in Germany, where he focused on crystalline silicon photovoltaics (monocrystalline and multicrystalline) until 2003, working on various aspects of hydrogenation, gettering, and metal contact formation to silicon emitters.

He then joined the Swiss Federal Laboratories for Materials Testing and Research (EMPA, Thun, Switzerland) where he worked on the mechanical properties of semi-conductors, laser bars and wafer sawing processes for solar wafers.

In 2004, he became full professor and chair of the Institute of Microengineering, University of Neuchâtel, Switzerland, taking over the activities of Prof. Arvind Shah. While accompanying the industrial developments of thin film silicon and pushing the technology to its limits, he set up a program on advanced crystalline silicon heterojunction devices. Within a short time, device voltages of about 700 mV could be demonstrated using a lean process based on parallel plate plasma enhanced chemical vapor deposition and sputtering, allowing for cost-effective production technology. This triggered industrial interest. In 2008, the company Roth and Rau established a subsidiary in Neuchâtel, starting a long cooperation to bring the technology to maturity. In 2007, he was also a founder of Indeotec, a company that supplied new generation deposition tools to his laboratory.

In 2009, the Institute of Microengineering was transferred to EPFL, where Christophe Ballif became an ordinary professor, keeping his laboratory in Neuchâtel. In 2012, he was a founding member of the new PV Center within the Swiss Center for Electronics and Microtechnology (CSEM) in Neuchâtel, a first official center in Switzerland dedicated to industrial solar research. Now he shares his time between the two institutions, attempting to find the right synergies between more fundamental research at EPFL and applications at CSEM.

In recent years, his research groups have continued to expand and innovate, showing, for instance, some of the first high efficiency perovskite/silicon tandem devices, and, together with NREL, achieving world record two-junction devices obtained by combining III-V on top of Si heterojunction. His work on passivating contacts extended to both alternative materials and contacts that are able to withstand high temperatures. In the last years, he also developed activities in the field of building-integrated photovoltaics. Prof. Ballif was one of the inventors of the white "efficient" photovoltaic panels, now industrialized by the company Solaxess, and recently his team introduced high-resolution photographic and photovoltaic images. His activities also include aspects of storage, energy and electricity management.

Prof. Ballif authored or co-authored over 400 scientific and technical papers, as well as a number of patents.

Prof. Andres Cuevas

received the Becquerel Prize in honor of his scientific merits in the development of silicon solar cells. The prize was awarded in 2015 on the occasion of the European Photovoltaic Solar Energy Conference in Hamburg, Germany.

Prof. Cuevas is one of the pioneers in the development of bifacial solar cells and also contributed significantly to the development of high-efficiency silicon solar cells. He made substantial contributions to determining and modeling the most important properties of silicon solar cells, including Auger recombination, bulk defect characterization, emitter properties, including detailed characterizations of many types of surface passivation. His work on the characterization of carrier lifetime parameters contributed considerably to the development of widely-used key measurement methods like the quasi-steady-state photoconductance method.



His superior understanding of the physics of solar cells has made him one of the key authorities in the field. With his engagement and his outstanding presentations, Prof. Cuevas has inspired generations of students and young scientists.

Excerpt from the Becquerel Prize diploma 2015

Curriculum vitae

Andres Cuevas was born in 1953 in Ponferrada, Spain, and studied electronics and telecommunications engineering at the Universidad Politécnica de Madrid (UPM), where he graduated in 1976. His PhD, completed in 1980 at the same university, was the first in Spain in the area of silicon solar cells. He became an associate professor at UPM in 1985 and was a Fulbright Fellow at Stanford University in 1988-89. In 1993 he moved to the Australian National University (ANU), where he has given courses in electronics, semiconductor devices, energy resources, photovoltaic technologies and solar cell physics. He was promoted to associate professor in 1998 and professor in 2003. He served as head of the ANU School of Engineering from 2007 to 2010 and deputy dean of the College of Engineering and Information Technology in 2013-14. In 2014, he was elected as fellow of the IEEE.

In 1980 as part of his early work on bifacial silicon solar cells, he had the idea of using them in flat plate PV modules, demonstrating experimentally a significant increase in their energy yield. Bifacial PV modules have since been investigated by other researchers and have recently become popular in the PV industry. He then focused on improving the performance of common

silicon solar cells. Breaking with the past, he introduced the relatively deep, moderately doped diffusions that later became the norm in high efficiency solar cell designs. The 19% efficient solar cell fabricated at UPM in 1988 was a European record at the time. At Stanford he contributed to the development of point-contact solar cells for concentrator applications.

His research group at ANU has been at the forefront of silicon PV technology for many years, with significant contributions across the areas of silicon materials, surface passivation and device fabrication. With co-workers he has contributed to the characterization of defects and impurities in silicon, the improvement of multicrystalline and upgraded metallurgical silicon, the determination of the fundamental limits to bulk recombination and solar cell efficiency, the development of effective surface passivation materials and techniques, the quantification of heavy doping effects, and the development of novel passivating contacts and carrier-selective conductors for high performance silicon solar cells. He has helped to understand the physics of solar cells, clarifying common misconceptions and deriving theoretical and computer models to support such understanding.

He has collaborated extensively, co-authoring 400 scientific publications and patents. He has been a visiting researcher at the CNRS in France, Fraunhofer ISE and ISFH in Germany, CNR and ENEA in Italy, ECN in the Netherlands, University of Lisbon in Portugal, UPC in Spain, EPFL in Switzerland and the University of Florida and Stanford University in the USA. He has also collaborated intensively with the PV industry via multiple joint projects dealing with various aspects of silicon solar cell technology.

Prof. Stefan Glunz

received the Becquerel Prize for his pioneering work in high-efficiency silicon solar cells. The prize was awarded 2014 on the occasion of the European Photovoltaic Solar Energy Conference in Amsterdam, The Netherlands.

Prof. Glunz is a pioneering leader in both basic and application-oriented research on silicon wafer-based photovoltaic energy conversion. His research has addressed a wide range of topics that are crucial for increasing the efficiency of solar cells and reducing the cost of solar electricity generation. This includes the analysis of electrically active defects in solar cells, development of performance-increasing technologies for solar cell manufacture, and minimizing the material demand in the production of solar cells. Dr. Glunz has taken a leading role in transferring research results into industrial production.



He was very active in setting up the European Strategic Research Agenda for Photovoltaics and is the initiator of a highly successful series of international workshops for PhD students (Silicon-FOREST). With his engagement Prof. Glunz contributed considerably to the worldwide success of photovoltaic electricity generation.

Excerpt from the Becquerel Prize diploma 2014

Curriculum vitae

Stefan Glunz was born in Dortmund, Germany in 1966. He received his diploma in physics in 1992 and his PhD in 1995 from the University of Freiburg. After his PhD he started working as a scientist in the research group for high-efficiency silicon solar cells at the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg. He became responsible for the silicon solar cell development in the clean-room of Fraunhofer ISE and is now head of the division "Photovoltaics – Research" at Fraunhofer ISE. His division consists of more than 180 members, including 25 PhD students. Their work focuses on high-efficiency silicon solar cells, characterization and emerging photovoltaics. He has extensive experience in managing both industry and public financed projects, including several large European projects. His research concentrates on the design, fabrication, and analysis of high-efficiency silicon solar cells, including the detailed characterization of the Si-SiO₂ interface and other dielectric passivation layers like Al₂O₃, the analysis of the metastable BO defect in Czochralski silicon and fundamental semiconductor parameters like Auger recombination. Other research fields are the development of new process technologies for the fabrication of high-

efficiency silicon solar cells, like passivating consisting of thin interfacial oxides and doped polycrystalline silicon layers contacts (TOPCon). His group at Fraunhofer ISE has set several international records, including the highest efficiency for multicrystalline silicon solar cells (22.3%). Beyond pure silicon photovoltaics he is especially interested in silicon-based tandem cells. Recently, a team of silicon and III-V specialists in his division at Fraunhofer ISE have managed to achieve an efficiency of 33.3% for a monolithic III-V/silicon tandem cell.

Since 2015, Stefan Glunz is full professor at the University of Freiburg, Germany. He is one of the founding professors of the new Institute for Sustainable Systems Engineering (INATECH) at the Faculty of Engineering, University of Freiburg. The research of INATECH is dedicated to energy systems, sustainable materials and resilience. In 2015, a new master program was started at the university, which focuses on these topics. Prof. Glunz is responsible for courses such as "Solar Energy" and "Photovoltaic Laboratory". His research at the university focuses on emerging PV technologies, such as perovskite solar cells and tandem cells.

Prof. Glunz is author/co-author of more than 100 journal articles and 250 conference papers and founding editor of the IEEE Journal of Photovoltaics. In 2008, he received the Eni Award for the promotion of science and technology in the field of renewable energy. He is a scientific committee member for several conferences and workshops in the field of photovoltaics and has initiated an international conference on crystalline silicon photovoltaics (SiliconPV).

Prof. Gabriel Sala

received the Becquerel Prize for his pioneering work on concentrator photovoltaic system development. The prize was awarded 2013 on the occasion of the European Photovoltaic Solar Energy Conference in Paris, France.

Gabriel Sala was among the first scientists in Europe who set up complete concentrator PV systems with power ratings up to almost half a megawatt. He coordinated several important European projects like EUCLIDES which were devoted to the research and development of concentrator photovoltaic technology. Through all his activities he paved the way for the industrialization of the concentrator photovoltaic technology.



Prof. Gabriel Sala is not only a pioneer in the development of photovoltaic concentrator systems; he also earned great merits in the field of analyses and evaluation of concentrator photovoltaic modules and power plants. With his expertise he contributed considerably to the development of several international standards for the concentrator photovoltaic technology.

Excerpt from the Becquerel Prize diploma 2013

Curriculum vitae

Prof. Gabriel Sala Pano was born in Barcelona, Spain in 1945. He graduated in Telecommunication Engineering (1970) by the Universidad Politécnica de Madrid (UPM) and obtained his PhD on the topic "Varicap Diode Made by Double Diffusion" (1973).

Serving as associate professor from 1973 and upgraded to chair in 1983, he was the director of 14 Ph.D. theses at UPM, all in the field of PV.

He has been director of the Department of Electronic Physics for two eight-year periods (1987-1995 and 2004-2012) and served as director of the Institute of Solar Energy (UPM) in 1985, 2014 and 2015.

He was the responsible of the technology transfer and industrialization of the bifacial silicon solar cell and module technology to the company ISOFOTON, created in 1981.

His activity in silicon, devices and solar cells switched to instrumentation for testing and concentrating photovoltaics in the early eighties. From 1978 to 1984, he developed the Ramón Areces (1981) and MINER (1984) concentrator arrays.

He was the inventor of the "Silicon on Glass" Fresnel lens (patented in 1979) which is used today by 90 % of the industry.

He developed several innovative cell testing instruments for Isofoton and for the INTA (Spain) and the European Space Agency (Noordwijk, NL).

At UPM, he became the head of the research group "Instruments and System Integration" whose main activities are photovoltaic concentration (CPV) and instrumentation for PV testing from its creation till 2017.

He participated in 37 competitive projects over the last 30 years. Nine were subsidized by the European Commission in the successive framework programs FP5 to H-2020. He was project coordinator for five of the projects. Of the remaining 28 national projects, he acted as principal investigator in 18. His research group has participated in 46 collaborative projects with industries and research centers; fifteen of them were not Spanish.

He is co-author of 5 patented inventions and 4 projects dealing with technology transfer to industry. All of them focus on CPV technology and CPV characterization equipment to be used both at the lab level or in the production line. He is co-author of Chapter 10 "Photovoltaic Concentrators" in the Handbook of Photovoltaic Science and Engineering, 2nd Edition, Wiley, (2011).

He was co-founder of Solar Added Value (<http://solaraddedvalue.com>), a technological company and spin-off from UPM, which focuses on the energy sector, particularly CPV technology. This company has lately received know-how developed by his research group, such as the solar simulators "Helios 3198" and "Helios 3030" for the indoor CPV module and receiver power measurement and binning in the production line. Also the Tri-band heliometer (CU-3J35) for spectral characterization of the DNI in CPV installations and in solar simulators is commercialized by the company.

He has served as a scientific committee member for 15 international conferences, as well as chair of the Technical Program Committee of the 10th EPVSEC, chairman of ICSC-4 Conference, head of the Spanish team of Working Group 7 of the IEC Technical Committee 82, which is devoted to the development of a CPV international normative and member of the National Committee AEN/CTN 206/SC82. He was also a member of the management board and coordinator of Sub-Programme 4 of Photovoltaics EERA (European Energy Research Alliance) up to 2015. Since 2015, he is Emeritus Professor at UPM.

Dr. Winfried Hoffmann

received the Becquerel Prize for his pioneering work in the industrialization of photovoltaic technologies. The prize was awarded in 2012 on the occasion of the European Photovoltaic Solar Energy Conference in Frankfurt am Main, Germany.

Winfried Hoffmann performed pioneering work in application-oriented research and development on both wafer-based and thin-film photovoltaic energy conversion. Through well targeted co-operations he established an intensive and highly effective information exchange between academia and industry which fostered substantially the progress in photovoltaics.

In leading positions in industry Winfried Hoffmann was the driving force behind the set-up of innovative large scale production sites as well as the manufacture of novel production equipment. In particular the integrated Smart-SolarFab was one of the pioneering steps in photovoltaic manufacture.



Winfried Hoffmann strongly contributed to the market stimulation of photovoltaics through his tireless engagement in national and international organizations; for many years he was president of the European Photovoltaic Industry Association (EPIA) and the German Bundesverband Solarwirtschaft (BSW). Winfried Hoffmann assisted in many European countries in the introduction of photovoltaic market support programs. With his engagement on the political level he helped to bring photovoltaic electricity generation on its way towards a future sustainable energy supply.

With this prize, the European Photovoltaic Community at its gathering in Frankfurt, Germany, expresses its recognition to Dr. Winfried Hoffmann for his extraordinary achievements in the field of PV Solar Electricity.

Excerpt from the Becquerel Prize diploma 2012

Curriculum vitae

Dr. Winfried Hoffmann was born 1949 in Speyer (Germany). He graduated in physics and received his PhD-thesis in biophysics. He joined the just formed photovoltaic R & D group for thin film solar cells at NUKEM (RWE) in 1979 and took over its leadership in 1985. His focus was Applied Research towards industrialization in the area of CdS/Cu₂S – thin-film solar cells and modules, amorphous silicon as well as dye solar cells. In the mid-1980s and 90s, a pilot production for MIS-inversion layer c-Si solar cells and large area modules was put in operation. The focus on PV systems in these years was for decentralized off-grid applications (e.g. Solar Home Systems and water pumping in developing countries).

He initiated the Joint-Venture in the photovoltaic field between NUKEM and Daimler-Benz Aerospace to form "Angewandte Solarenergie – ASE GmbH" in 1994, where he served as Managing Director. In the same year the acquisition of 100 % shares of Mobil Solar as a subsidiary company was done with special focus on their developed ribbon EFG technology. In the late 90s, the company was renamed RWE Solar and was one of the worldwide 5 biggest production companies. The first inline PE-CVD machines for SiN were developed and built in these years.

In October 2002, the joint venture between RWE Solutions and SCHOTT, the RWE SCHOTT Solar GmbH, was formed, where he served as Chairman of the Board. Effective in 2005, SCHOTT acquired the shares of RWE Solutions and the company was renamed SCHOTT Solar GmbH, where he was member of the Management Committee.

In 2007, he joined Applied Materials to become Chief Technology Officer and Vice President of the Solar Business Group and member of the Management Board of the German based Applied Materials GmbH. From November 2010 he served with his consulting company Applied Solar Expertise – ASE to the solar business of Applied Materials.

He served many years until 2008 as member of the Board of the German Solar Economy Association (Bundesverband Solarwirtschaft – BSW Solar), lastly as president. Until March 2014 he served as member of the board for the European Photovoltaic Industry Association (EPIA, now SolarPower Europe) for 17 years, half of this time as president. In 2010/11 he was member of the High Level Group on Key Enabling Technologies to advise three EU-commissioners on a strategy to strengthen particularly the European production industry.

Until 2016 he was member of the supervisory board of the company SMA Solar Technology AG as well as chairman of the Supervisory Board of Solar-Fabrik AG.

For many years is served as member of the Board of Trustees to the Fraunhofer Institute for Solar Energy Systems ISE and the Helmholtz Center in Berlin (HZB).

He is currently independent consultant and member of the Board of Trustees of the Center for Solar Energy and Hydrogen Research (ZSW), chairman of the scientific board of DLR-Institute of Networked Energy Systems (Oldenburg) and member of the Scientific Board of the Institute for Solar Energy Research in Hameln (ISFH).

Since 2011 he gives lectures about Renewable Energy at the universities of Konstanz and Freiburg. In 2012 he received the John Bonda prize from EPIA. The World Renewable Energy Network (WREN) awarded him as "Solar Pioneer" in 2014.

Prof. Wim Sinke

received the Becquerel Prize for his pioneering work on wafer based silicon photovoltaic cells and modules. Wafer-based silicon constitutes today's dominant technology family for photovoltaic solar electricity generation. The prize was awarded 2011 on the occasion of the European Photovoltaic Solar Energy Conference in Hamburg, Germany.

Wim Sinke worked successfully over many years towards the understanding and the improvement of silicon solar cells, in particular in the areas of surface passivation, doping and contact formation, and on integrating cell and module designs. He took a leading role in transferring research results into production.



Wim Sinke has great merits as the coordinator of the extensive European integrated project on wafer-based silicon photovoltaics "CrystalClear." The project contributed substantially to the development of the PV sector in Europe.

As chairman of the Working Group on Science, Technology & Application, Wim Sinke contributed considerably to the development of the Strategic Research Agenda of the European Technology Platform.

Excerpt from the Becquerel Prize diploma 2011

Curriculum vitae

Wim C. Sinke (21.11.1955, Vlissingen, NL) is Principal Scientist Solar Energy at ECN part of TNO in Petten, The Netherlands, and professor of photovoltaic energy conversion at the University of Amsterdam. He is a visiting scientist at research institute AMOLF in Amsterdam, co-chairman of the European Technology and Innovation Platform for Photovoltaics and board member of the TKI Urban Energy (the Netherlands public-private partnership for energy innovation in the urban environment, including solar energy).

Wim Sinke studied experimental physics at Utrecht University, where he graduated in 1981, working on a project concerning ultra-fast direct casting of crystalline silicon for photovoltaic applications. Subsequently, he carried out his PhD research at AMOLF on ion implantation and pulsed laser annealing for controlled doping of crystalline silicon for solar cells. He received a doctoral degree from Utrecht University in 1985 for a thesis

entitled "New physical processes for silicon solar cells". From 1986 to 1987 he was a visiting scientist at the Hitachi Central Research Laboratory in Tokyo, where he worked on the atomic structure of thin-film amorphous silicon. In 1987, he re-joined AMOLF to work on crystalline silicon solar cells, material properties of amorphous silicon, and ion and laser processing of semiconductors. In 1990, he moved to the Energy Research Centre of the Netherlands ECN to set up a new group on photovoltaics. This group has grown to a size of 80 staff and covers a range of topics, including industrial processing of wafer-based silicon solar cells and modules, roll-to-roll processing of thin-film solar cells and modules, wafer/thin-film hybrid tandem devices, environmental and economic analyses of PV, and PV applications. From 1994 to 2002, he was professor of Physics and Chemistry of Thin Films and Science & Applications of Sustainable Energy Systems at the University of Utrecht.

Wim Sinke has been, and still is, a member of various national and international advisory committees in the field of solar energy, renewable energy and related topics. He has published hundreds of scientific and popular papers and presented hundreds of scientific and popular lectures on all aspects of solar energy.

Wim Sinke has received several prestigious awards, including the FOM Jacob Kistemaker Prize in 1992 and the Royal Dutch/Shell Prize for Sustainability and Energy in 1999. In 2015 he was appointed a Knight in the Order of the Netherlands Lion for his contributions to the development and promotion of solar energy.

Prof. Hans-Werner Schock

received the Becquerel Prize for his pioneering work on copper indium gallium diselenide (CIGS) thin film solar cells. This technology is one of the most promising thin film technologies with the highest efficiency of any thin film solar cell today. The prize was awarded 2010 on the occasion of the European Photovoltaic Solar Energy Conference in Valencia, Spain.

Hans-Werner Schock worked successfully over many years towards understanding the extraordinary properties of chalcopyrite materials concerning defect tolerance, junction formation and grain boundary recombination. He took a leading role in transferring his results into production.



He also has great merits as coordinator of several European (EUROCIS) research projects on chalcopyrite-based solar cells. These projects contributed substantially to the development of European CIGS companies. Record efficiencies for several chalcopyrite based systems were achieved in his laboratory.

Excerpt from the Becquerel Prize diploma 2010

Curriculum vitae

Hans-Werner Schock was born in Tuttlingen, Germany in 1946. He received his diploma in electrical engineering from the University of Stuttgart in 1974, where he worked on compound semiconductor thin films for solar cells and electroluminescence. Since 1982, he was research group and scientific project leader "Polycrystalline thin film solar cells" at the Institute of Physical Electronics, University of Stuttgart.

In 1986 he received his PhD for the development of evaporation technologies for thin film solar cells. His work was one of the pillars for the foundation of the Center for Solar Energy Research in Stuttgart.

As a coordinator of a series of European projects (EU-ROCIS) from 1985 to 2004, he promoted the CIGS solar cell technology on a European level, including a number of research groups from various countries who contributed a variety of approaches for making CIGS technology manufacturable.

In 2000, he contributed as a research scholar at the Institute of Energy Conversion, University of Delaware to the development of deposition processes of $\text{CuIn}(\text{Se,S})_2$ films. Hans-Werner Schock authored or co-authored more than 330 contributions in books, reviewed journals and conference proceedings. He is inventor or co-inventor of more than 10 patents in the field of thin films and thin film solar cells.

In 2004, he took the position as director of the institute "Technology" at the Hahn-Meitner-Institut in Berlin (now Helmholtz-Zentrum Berlin). In 2005 he was appointed honorary professor at the faculty of Electrical Engineering and Computer Science of the Technische Universität Berlin. He was awarded an honorary doctoral degree at the Tallinn University of Technology, Tallinn Estonia in 2013.

From 2006 to 2011, he was spokesperson of the Solar Energy Research Division at the Helmholtz Zentrum Berlin.

He was a member of numerous scientific committees and has acted as session organizer of many photovoltaic conferences and of MRS and EMRS symposia. He was chairman of the 10th and 16th Conference on Ternary and Multinary Compounds.

Since his retirement in 2015, he works as an independent consultant to companies and research institutions.

Dr. Andreas Bett

received the Becquerel Prize for his pioneering work on monolithic multi-junction solar cells leading to a world record efficiency of 41.1%. The prize was awarded 2009 on the occasion of the European Photovoltaic Solar Energy Conference in Hamburg, Germany.

He introduced the lattice mismatched growth technique that is a key to record efficiencies. He further developed characterization techniques and simulation tools for concentrator multi-junction solar cells. In his laboratory, he researched and achieved significant advances in concentrator modules and systems including long term stability. The FLATCON concept was developed and successfully introduced into production.



Dr. Bett is not only a pioneer in research and development of III-V multi-junction solar cells but he also earned great merits for the industrialization of concentrating photovoltaic technology. He is a cofounder of Concentrix Solar which is today one of the leading companies in this market sector.

Excerpt from the Becquerel Prize diploma 2009

Curriculum vitae

Andreas Bett was born in Furtwangen, Germany, in 1962. In 1981 he began his studies in physics, mathematics and sport at the University of Freiburg. In 1987 he joined the Fraunhofer Institute for Solar Energy Systems in Freiburg as a diploma student. He finalized his diploma thesis "Optimizing GaAs/AlGaAs epitaxial layers for application in solar cells" in 1988 and received a diploma degree in physics from the University of Freiburg. He continued his research at Fraunhofer ISE and worked on the topic III-V on Si for solar applications. In 1992 he published his PhD thesis "Development of GaAs solar cells on foreign substrates" and received his PhD degree from the University Konstanz.

In 1993 he became the head of the III-V Solar Cells and Epitaxy group at Fraunhofer ISE. He pushed for the development of high-efficiency GaAs solar cells. He developed liquid-phase technology processes based on the etch-back regrowth principle to fabricate single-junction heteroface GaAs solar cells. Later he used molecular beam epitaxy before metalorganic vapor epitaxy became the industrial feasible technology for III-V-based multi-junction solar cells. He and his team developed very radiation-hard solar cells for space and transferred this

technology to AZUR Space Solar Power in Germany. In order to deploy high-efficient multi-junction solar cells on the earth, he started research on concentrating photovoltaic technology. In co-operation with colleagues from the Ioffe-Institute, Russia, the FLATCON technology was developed at Fraunhofer ISE. A specialty of this module type is the use of Fresnel lenses made in silicon-on-glass technology. This technology has been transferred to industry. By introducing and pushing the metamorphic growth concept, the efficiency of triple-junction solar cell could be enhanced up to 41.1 % in 2009. This was the world record efficiency at that time. This achievement was recognized by receiving the Becquerel Prize that year. The R&D on III-V cells and CPV modules continues as Dr. Andreas Bett became Head of the Division of Materials – Solar Cells and Technology in 2007. In this role he was responsible for silicon material development for photovoltaic applications. Another highlight of his work was the achievement of an efficiency of 46.1% for a wafer-bonded four-junction solar cell in 2015. A mini-module equipped with a four-junction solar cells yielded 43.4% module efficiency in 2016.

Since 2017, he is the director of the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg, Germany.

Dr. Andreas Bett was and is very active in transferring R&D achievements into industrial production. In 2006 he co-founded the company Concentrix, a spin-off of Fraunhofer ISE that aimed to commercialize the FLATCON technology. He was a Member of the Board until the company was bought by Soitec in 2009. In 2015 he co-founded the company NexWafe as a spin-off from Fraunhofer ISE. This company commercializes a kerfless silicon wafer technology which was developed in his division. He is still a board member of this company.

Dr. Bett has received widespread recognition for his work. In 2010 he received the Joseph-von-Fraunhofer Prize and the European Earto Prize. In 2012 he received, together with Hansjoerg Lerchenmüller, the high-ranking Deutscher Umweltpreis for his efforts and achievements in the industrialization of CPV technology.

Dr. Bett published more than 300 papers and holds 19 patent families. He has served and serves in many international scientific conference committees and several academic and industrial boards.

2008

Mechtild Rothe

received the Becquerel Prize for her enormous merits in the success of photovoltaics and all renewables. The prize was awarded 2008 on the occasion of the European Photovoltaic Solar Energy Conference in Valencia, Spain.

In 1994 she became Socialist rapporteur for the Parliament's Initiative demanding a European Action Plan for the Renewable Energies. Later, when the EU Commission came out with the Green Paper for the Renewable Energies in 1996, the White Paper a year later, fixing an objective of 3 GW of PV for Europe by 2010, and eventually in 2001 the EU Directive for Renewable Electricity she was in each case a key supporter in her role as the Parliament's official rapporteur. This work was completed in 2006 with her being the rapporteur of the EU Directive on Energy Efficiency.

Since 2003 she took the leadership of the association EUFORES, the network for the promotion of the Renewable Energies among Parliamentarians throughout Europe.



Prof. Arvind Shah

received the Becquerel Prize for his ground-breaking work on silicon thin film solar cells. The prize was awarded 2007 on the occasion of the European Photovoltaic Solar Energy Conference in Milan, Italy.

Arvind Shah is the founder of the Photovoltaic Laboratory at the Institute of Microtechnology at the University of Neuchâtel, where he developed with his team the VHF (very high frequency) deposition technique for high-rate low cost deposition of amorphous silicon. At this laboratory he further developed microcrystalline silicon as a novel and viable solar cell material.



The PV Laboratory in Neuchâtel under Arvind Shah subsequently demonstrated the concept of the micro-crystalline-amorphous ("micromorph") tandem solar cell. This tandem solar cell combines the advantage of amorphous and microcrystalline silicon. The "micromorph" concept has become one of the main avenues followed by industrial laboratories worldwide to establish low cost solar cell production.

Excerpt from the Becquerel Prize diploma 2007

Curriculum vitae

Arvind Shah was born 04.12.1940, in Bombay, India. He attended the ETH Zürich, where he graduated as an electrical engineer in 1964. In 1968, he completed his PhD in applied physics on the topic of memory applications of ferroelectrics. He was lecturer and group leader of R&D at the Department of Industrial Research of the ETH Zürich from 1968 to 1975.

In 1975, he founded and co-directed the Centre for Electronics Design and Technology (CEDT) at the Indian Institute of Science in Bangalore. CEDT is now one of India's leading University Centres in the field of Electronics. It has a strong industrial orientation.

In 1979, Arvind Shah was appointed professor at the University of Neuchâtel in Switzerland, where he built up the Photovoltaics Research Laboratory (PV Lab Neuchâtel) as a part of the Institute of Microtechnology (IMT).

PV Lab Neuchâtel has done pioneering work in the establishment of low-cost production methods for solar cells based on silicon. In 1987, PV lab introduced a novel plasma-assisted deposition method called "VHF deposition" permitting a significant increase in the deposition rate for thin-film silicon layers. In 1994, PV Lab Neuchâtel introduced microcrystalline silicon deposited by VHF plasma and with very low oxygen content as a novel photovoltaically active material for use as absorber layer within thin-film solar cells. From 2003 onwards, VHF deposition has been adopted by many industries in Europe, the USA and Japan.

PV Lab Neuchâtel also performed significant work on the development of transparent conductive oxides as contact layers for solar cells. At PV Lab Neuchâtel, zinc oxide layers with a very high degree of texturing were developed; these permitted an enhanced light-trapping effect within the solar cells.

Furthermore, PV Lab Neuchâtel was active in demonstrating novel methods for the design and fabrication of lightweight, low-cost flexible solar cells.

In recent years at PV Lab Neuchâtel, special emphasis is increasingly being given to (a) high-efficiency solar cells, (b) transparent contact layers and other layers for light trapping and light management within solar cells, (c) all fabrication steps in solar module production, (d) solar module testing and (e) architectural integration of photovoltaics.

From 1987 on, Arvind Shah was a part-time professor at the EPF Lausanne, Switzerland. In October 2005, he retired from his position as head of the PV Lab and professor at the University of Neuchâtel and EPFL. Since then he has been active as a scientific consultant to the PV Lab and to various industries in Europe, India and the USA.

Arvind Shah is author or co-author of more than 250 papers in scientific journals. He was also the initiator, main contributor and editor of the book "Thin-Film Silicon Solar Cells," published by the EPFL Press in 2010.

Arvind Shah received the Swiss Solar Prize, together with Johannes Meier in 2005.

Prof. Richard M. Swanson

received the Becquerel Prize in 2006 for his ground-breaking work on high-efficiency silicon solar cells. The prize was awarded on the occasion of the European Photovoltaic Solar Energy Conference in Dresden, Germany.

Prof. Swanson developed record-setting silicon solar cells, first during his long career at Stanford University and later at the company SunPower, of which he was the founder and president. His group at Stanford achieved 23 % efficiency on large area silicon cells and 28% under concentrated light. Prof. Swanson's industrial cells powered the winning car of the 1993 Solar Challenge



and NASA's unique high-altitude solar-powered airplane. His recent success is the establishment of a company which produces the highest efficient commercial PV modules. Furthermore Dr. Swanson published more than 150 articles. He combines in an exemplary way outstanding science and industrial leadership.

Excerpt from the Becquerel Prize diploma 2006

Curriculum vitae

Richard Swanson was born in Davenport, Iowa in 1945. He received his BSEE and MSEE from Ohio State University in 1969 and then began dissertation research as a National Science Foundation Fellow at Stanford University. His research into the modeling and fabrication of CMOS integrated circuits for micro-power applications resulted in the theory and first published experimental data on threshold adjustment by ion-implantation, which is now a common industrial practice that enables low-voltage, battery powered electronics. He also developed the first theory on the operation of MOS transistors in the "weak inversion" regime. His paper, "Ion-implanted Complementary Transistors in Low-voltage Circuits", jointly authored with Prof. Meindl, was awarded classic paper status by the Journal of Solid State Circuits in 2003 as one of the ten most cited papers since the inception of the journal in 1966.

After receiving the Ph.D. in 1974, he received an IBM post-doctoral fellowship at Stanford University to study techniques for solar-electric power generation. In 1976, he joined the faculty at Stanford as assistant professor of Electrical Engineering and obtained funding from

the Electric Power Research Institute to investigate thermophotovoltaic energy conversion for solar applications. Since then, he has been actively involved in photovoltaic research and industrialization. He was promoted to Associate Professor in 1982.

At Stanford Prof. Swanson supervised 13 doctoral students, many of whom are active in the photovoltaics industry. His areas of research have generally involved investigation into the semiconductor properties of silicon relevant for better understanding the operation of silicon solar cells. This has included studies of heavy doping effects, surface recombination, minority carrier transport, gettering, defect recombination kinetics, Auger recombination, and light-trapping. These studies have helped pave the way for steady improvement in silicon solar cell performance. Prof. Swanson and his group conceived and developed the point-contact solar cell. Laboratory version of these cells achieved 28 percent conversion efficiency in concentrator cells and 23 percent large-area one-sun cells.

In 1991 Prof. Swanson resigned from his faculty position to devote full time to SunPower Corporation, a company he founded to develop and commercialize cost-effective photovoltaic power systems. In its early days, SunPower solar cells powered Honda to victory in the 1993 World Solar Challenge, and powered NASA's high altitude solar powered airplane, Helios, to 96,500 feet, a record altitude for any non-rocket aircraft. SunPower received the NASA Public Service Award for its contribution to the Helios program. These record-setting cells received the IR100 award in 1995. Prof. Swanson retired from SunPower in 2012.

Prof. Swanson has received widespread recognition for his work. In 2002, he was awarded the William R. Cherry award by the IEEE for outstanding contributions to the photovoltaic field. He was elected a Fellow of the IEEE in 2008 and a member of the National Academy of Engineering in 2009. He received the 2009 Economist Magazine Energy Innovator Award. In 2010, he was awarded the IEEE Jun-ichi Nishizawa Medal for the conception and commercialization of high-efficiency point-contact solar cell technology, and in 2011 the Karl Boer Solar Energy Medal of Merit Award.

Prof. Swanson serves on the board of directors of the Worldwatch Institute, a Washington, DC based environmental think-tank. He is also a consulting professor with the Precourt Institute for Energy at Stanford University, and chairperson of the Bay Area PV Consortium industrial advisory board.

Dr. Dieter Bonnet

received the Becquerel Prize as one of the main pioneers of solar cells derived from II-VI compounds. Dieter Bonnet has committed his whole professional life to their development and promotion. The prize was awarded in 2006 on the occasion of the World Conference on Photovoltaic Energy in Hawaii, USA.

From the 1960s onwards, he was one of Europe's leaders in the field and did not vacillate when the world's PV policy was less supportive. Today's commercial success proves him right. Dr. Bonnet started his career in 1965 at the Battelle Institute in Frankfurt, Germany. In 1970, he developed the world's first CdTe/CdS thin-film solar cells in the presently known configuration and in 1972 he achieved an AM0 efficiency of 6%. In 1993, he created the successful solar firm ANTEC.



Dieter Bonnet has initiated SOLARPACT, a global network that connects research groups and industrial units to promote the technology of photovoltaic modules based on CdTe and related components towards a cost-competitive mass production and is currently the coordinator of it.

Excerpt from the Becquerel Prize diploma 2006

Curriculum vitae

Dieter Bonnet was born on 27.05.1937 in Stuttgart, Germany. He has received his master degree at the University of Frankfurt in 1961 and his PhD in 1963 on photoelectric properties of organic materials.

Dr. Dieter Bonnet started his professional career in 1965 at the Battelle Institute in Frankfurt, Germany, where he soon became head of the Department of Solid State Physics. He dedicated many years to R&D in the field of solar photovoltaic thin film cells where he has made particular contributions to CdSe, CdS and CdTe since 1968.

When the Battelle Institute was closed down in 1993, Dieter Bonnet together with other employees initiated a buyout from the institute and so he became a co-founder and shareholder of ANTEC GmbH, out of which grew the solar firm ANTEC Solar in Arnstadt, Thuringia. As head of the Solar Energy Department of ANTEC, Dieter Bonnet continued the development of the CdTe technology and brought it to mass production maturity. This enabled ANTEC Solar 2001 to start the operation of the worldwide first commercial CdTe thin film solar production.

In June 2001, the City Council of Arnstadt honoured his merits in building up the first solar factory in Arnstadt by naming a street "Dr.-Bonnet-Weg". Later, numerous solar companies followed the example of ANTEC Solar and settled in Arnstadt.

In his time with ANTEC, Dieter Bonnet joined together the European scientific CdTe community and became coordinator of several European CdTe research projects funded by the EU Commission.

After his retirement, he did not rest but remained as active as before. As an advisor, he supported the creation of CTF Solar as the successor company of the ANTEC group. As long as his health allowed, he shared the daily business of CTF Solar on CdTe technology research and production factory engineering. His ideas and his advice were asked for by both scientists and engineers alike. Also, he continued to be active in consulting European and American research groups.

Prof. Joachim Luther

received the Becquerel Prize for his outstanding contributions in the field of photovoltaics through successful leadership of the Fraunhofer Institute for Solar Energy Systems ISE, in selecting and organizing R&D on the most promising topics in silicon, III-V solar cells, concentrators, thermophotovoltaics and organic cells. The prize was awarded in 2005 on the occasion of the European Photovoltaic Solar Energy Conference in Barcelona, Spain.

Already in the 1970s, Joachim Luther outlined the important role of renewables in a future energy system in publications. Prof. Luther has assumed leading positions in major international solar associations and served in high level government advisory councils. He earned great merits for promoting collaborations between European PV industries and research institutions.



Curriculum vitae

Joachim Luther was born on March 31, 1941 in Hannover, Germany. He received his PhD in atomic physics from the University of Hannover in 1970. From 1974 to 1993, he was a full professor for applied physics at the University of Oldenburg, Germany. Since 1993, he held the position as full professor for solid state physics and solar energy at the University of Freiburg, Germany and served, in parallel, as institute director of the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg, Germany until 2006. In 2008, Prof. Luther became Founding Director and Chief Executive Officer of the newly founded Solar Energy Research Institute of Singapore (SERIS). Prof Luther was a leading member of numerous important national and international organisations.

Joachim Luther has almost forty years of experience in research and development of renewable energies. His main areas of focus are solar electricity generation, solar and energy efficient buildings and sustainable energy systems based on renewable energy sources.

In photovoltaic energy conversion, his main focus was on silicon wafer-based solar cells and modules, photovoltaic energy converters under optical concentration (CPV) based on III-V semiconductors and organic photovoltaics. In PV system technology, his activities on smart power electronics (including the use of novel semiconductors) and the field of energy weather forecasting may be highlighted. Fraunhofer ISE was and is an important industry-oriented R&D institute in these fields and holds many world records in efficiency and cost-reducing technologies.

At the University of Oldenburg under Joachim Luther, the energy autonomous laboratory "Energielabor" was realized in 1982. Under his direction, Fraunhofer ISE moved into a modern, energy-efficient laboratory building in 2001 and a complete R&D manufacturing line for silicon wafer PV cells (industry size) was inaugurated in 2006 at Fraunhofer ISE.

In 2005, Joachim Luther won the German Environmental Award of the Deutsche Bundesstiftung Umwelt and the International Rheinland Prize for Environmental Protection. In 2006, he received the Fraunhofer Coin "for outstanding merits within the Fraunhofer society". In 2008 he was recognized by TIME magazine as Hero of the Environment, and in 2009, he won the Achievement through Action Award of the International Solar Energy Society (ISES).

Since 2006, Joachim Luther is Professor Emeritus at the University of Freiburg and Director Emeritus of the Fraunhofer Institute for Solar Energy Systems ISE, Freiburg.

Prof. Masafumi Yamaguchi

Awarded with the Becquerel Prize in 2004 on the occasion of the 19th European Photovoltaic Solar Energy Conference in Paris / France.

Curriculum vitae

Professor at the Toyota Technological Institute,
Director of the Super High Efficiency Photovoltaics
Research Center.

Masafumi Yamaguchi was born in Hokkaido, Japan,
on February 3, 1946. He received his B.S. and Ph.D.
degrees from Hokkaido University in 1968 and 1978,
respectively.

In 1968, he joined the NTT Electrical Communications
Laboratories, where he was engaged in research on
radiation damage to semi-conductor devices, blue light
emitting diodes, MBE, heteroepitaxy Si, III-V compound
solar cells and materials, photonic functional devices
and integration working as a Supervisor and a Section
Head.

Dr. Yamaguchi was the first to demonstrate the superior
radiation-resistance of InP materials and solar cells, and
discovered the light-illumination-enhanced annealing
phenomena of radiation damage to InP. His group also
developed high-efficiency and radiation-resistant InP
cells with efficiencies of 17% at AM0, and showed
the great potential of InP cells for space applications
in 1983. The first satellite using InP cells (the lunar
mission of the Japanese scientific satellite MUSES-A)
was launched in early 1990. His group also proposed a
double-hetero structure tunnel junction for realizing a
high performance and stable multi-junction cell inter-
connection in 1987.

They developed high-efficiency (20% at AM1.5G)
GaAs solar cells fabricated on Si substrates in 1989 and
demonstrated space flight experiment using GaAs-on-Si
cells in 1994.

In 1994, he moved to his present position. He has
contributed to the attainment of high efficiency InGaP/
GaAs/InGaAs and InGaP/InGaAs/Ge 3-junction cells
with efficiencies of 33.3% (1-sun AM1.5G) and 37.4%
(200-suns AM1.5). Both efficiencies remain world
records. He has also contributed to develop high-
efficiency InGaP/GaAs/Ge 3-junction solar cell modules
(area of about 7,000cm²) with an outdoor efficiency of
28.0% in collaboration with Daido Steel, Daido Metal
and Sharp Co.

As regard to his activities in academic societies, Dr.
Yamaguchi has been an International Committee
member for the European Photovoltaic Solar Energy
Conference since 1994. He was a Vice General Chair-
man, Vice Program Chairman and Program Chairman
of the 1st, 2nd and 3rd World Conference on Photo-
voltaic Energy Conversion (WCPEC) in 1994, 1989 and
2003, respectively. He was also a Chairman of the
Next Generation Photovoltaic Power Generation
Technologies Research Committee of the Institute of
Electrical Engineers of Japan. He is an Editor of the
journals "Progress in Photovoltaics" and "Renewable
and Sustainable Energy Reviews".

He made considerable contributions to R&D of photo-
voltaic technology as a member of the New Sunshine
Program Promotion Committee of the Ministry of Inter-
national Trade and Industry and as a Chairman of
Super High-Efficiency Solar Cell Committee of the New
Energy and Technology Development Organization.

He has published more than 200 original papers and
presented at more than 250 International Conferences.
He received the Vacuum Science Paper Award of the
Vacuum Society of Japan for the study of Si MBE in
1981, the Irving Weinberg Award for contributions to
Space Photovoltaics in 1997, the Best Technical Report
Award for contribution to Next Generation Photovoltaic
Technologies in 2001, the Best Paper Awards at the
PVSEC-12 in 2001, WCPEC-3 in 2003 and PVSEC-14
in 2004 for the study of High-efficiency Multi-junction
Solar Cells, and Renewable Energy Pioneers Award
in 2002.



Dr. rer. nat. Wolfgang Palz

Awarded with the Becquerel Prize in 2003 on the occasion of the 18th European Photovoltaic Solar Energy Conference, jointly organised with the 3rd World Conference on PV Technology in Osaka / Japan.

Curriculum vitae

Wolfgang Palz holds a Ph.D. in Physics from the University of Karlsruhe, Germany. His thesis was concerned with the infrared photovoltaic effects in CdS.

He was a Professor for Electronics in Nancy, France, before becoming in the early 1970s a leader of the French PV Programme on behalf of CNES, the National Space Agency in Paris.

In 1973, he was the organiser of the PV Section of the UNESCO Congress "The Sun in the Service of Mankind" in Paris. Later, UNESCO published in 7 languages his book "Solar Electricity".

In 1974 he participated as a French Delegate in the design of the Commission's first Renewable Energy Programme where he made sure that PV had a prominent position. From 1977 onwards, he directed for 20 years that Programme at the Commission in Brussels and oversaw a total budget of well over 500 Million Euro during that period. The Programme played a central role in all European development and accompanied a market growth from almost nothing to 9,000 Million Euro now.



Emphasis in PV Development was given to silicon and the whole family of the 2-6 compounds. To prepare the markets, system technology was given due attention early on. Integration in buildings was promoted and as early as 1983, a total of 1 MW of PV power had been developed all over Europe by the European Programme. In 1977, Dr. Palz initiated the European PV Conferences which has become the largest worldwide today. In the mid-1980s, he initiated EPIA, the European PV Industry Association.

After having organised on behalf of the Commission the Congress "Solar Energy for Development" in 1979 in Varese, Italy, mustering 80 Government delegations from 4 continents, Wolfgang Palz proposed in the early 1990s "Power for the World", targeting the rural poor. From 1997 to 2002, he was in charge of the Commission's RE projects for aid with the developing countries.

In 1997, he was one of the initiators of the EU White Paper which fixed RE targets for 2010. From 2000 until 2002, he was a Member of the Bundestag Commission for Energy in Berlin which proposed Energy Targets for Germany up to 2050.

For his role in wind energy, he was declared Wind Energy Pioneer in 1996 by the British Wind Energy Association and was awarded EWEAS' Poul laCour Prize in 2003. Also in 2003, he received the Order of Merit of the Federal Republic of Germany.

Prof. Viacheslav Andreev

Awarded with the Becquerel Prize in 2001 on the occasion of the 17th European Photovoltaic Solar Energy Conference in Munich / Germany.

Curriculum vitae

Prof. Viacheslav Andreev, born 18.09.1941, in Astrakhan, USSR, Russian citizenship. Professor and Head of the Laboratory of the A. F. Ioffe Physico-Technical Institute.

Field of Investigations

Physics and technology of the devices based on III-V heterostructures such as solar cells, thermophotovoltaic cells, heterolasers, light emitting diodes and radiation detectors.

The Main Achievements

He obtained for the first time, AlGaAs/Ga heterostructures in the beginning of 1967, high voltage (900V) diodes and light emitting diodes (LED) based on these heterostructures. In 1976, he achieved the LED external quantum efficiencies of: 40-45% for wavelengths of 800-900 nm and 10% for the wavelength of 670 nm.

He invented (with Zh. Alferov) in the end of 1969 double heterojunction AlGaAs/GaAs/AlGaAs lasers and obtained for the first time the laser generation in continuous mode at room temperature. He invented AlGaAs/GaAs solar cells (at the end of 1969). He developed and promoted the technology of high scale production of space solar cells in NPO "Kvant". Achieved, in 1994, the efficiencies of 24.7% (AMO, 100 suns) and 27.6% (AM 1.5, 140 suns) in single junction cells as well as 32-33% (AM1.5D, 100-300 suns) in tandem cells.

He designed (with V. Rumyantsev) concentrator photovoltaic modules based on high efficiency single and tandem solar cells with point and linear focus concentrators. He designed high efficiency cells for thermophotovoltaic generators based on fuel-fired emitter. He designed the isotope powered batteries and radiation detectors.

Scientific Biography

- 1963 Graduated Electrotechnical University, St. Petersburg
- 1969 PhD obtained at A.F. Ioffe Institute
- 1972 Obtained the National "Lenin Prize" for the R&D of heterostructures devices
- 1979 Doctor of Sciences Degree obtained at A.F. Ioffe Institute
- 1981 Head of Photovoltaics Laboratory of A.F. Ioffe Institute
- 1983 Title of Professor
- 1984 Head of Photovoltaic Section in the Council at Russian Academy of Sciences
- 1986 Obtained the National "State Prize" for the R&D of the optoelectronic devices
- 1996 Obtained the "A.F. Ioffe Prize for Semiconductor Physics"
- 1999 Corresponding (foreign) member of the Spanish Royal Academy of Engineering
- 2001 Obtained the "European Becquerel Prize" for the R&D in the field of Photovoltaics



2000

Mr. Frederick C. Treble

Awarded with the Becquerel Prize in 2000 on the occasion of the 16th European Photovoltaic Solar Energy Conference in Glasgow, Scotland / United Kingdom.



Curriculum vitae

Fred Treble is one of the pioneers of photovoltaics. After distinguished work in aerospace engineering, he joined a group of Britain's Royal Aircraft Establishment (RAE) in 1959 to investigate new means of generating electricity. Photovoltaics proved to be the most promising, and thus began his long involvement with PV technology development and application. In 1960, he was appointed head of the Solar Cell Group in the Space Department at RAE, where he remained until his retirement in 1977. He was responsible for all aspects of PV systems for satellites and for managing R&D contracts on crystalline silicon and CdS cells and modules.

On retirement, Treble established himself as a consultant and worked closely with the European Commission programmes on the selection and monitoring of PV R&D and demonstration projects.

He collaborated with the Joint Research Centre (JRC), Ispra, to develop test and measurement procedures. His work on the European PV Pilot projects highlighted the need for design qualification tests. Results of this work have since become international standards.

He is currently very active in the Solar Energy Society (UK-ISES) and British Photovoltaic Association (PV-UK), serving on committees and giving lectures.

Dr. Walter Sandtner

Awarded with the Becquerel Prize in 1998 on the occasion of the 15th European Photovoltaic Solar Energy Conference, jointly organised with the 2nd World Conference on PV Technology in Vienna / Austria

Curriculum vitae

I was born in Rosenheim (Germany) on October 12, 1943. I studied law, including international law, at the University of Munich, the Ecole Nationale d'Administration (ENA) in Paris and at the Harvard University and Fletcher School of Law and Diplomacy in Cambridge, Mass., USA.

After four years in the Bavarian State Ministry of Finance, Munich, and the Commission for the Reform of the German Constitution, Bonn, I entered in 1974 the Federal Ministry for Research and Technology (BMFT), Bonn, where I was first responsible for the European Research Organisations CERN, EMBL, ESO, OECD-IEA, OECD-NEA and Eurochemic. In May 1981 I became Scientific Attaché at the German Permanent Representation with the EU, Brussels.

From 1989 to 1996 I was Head of the Division for Renewable Energies in the BMFT, where I elaborated some programmes in the field of renewable energies. The most visible one was the "Thousand Roofs PV Programme", which came into force on July 1st, 1990. At the time it was world-wide the most important PV programme.

Though it was called for reasons of simplicity "thousand", indeed more than 2000 roof-installed PV systems were supported, systematically spread all over Germany. The programme met with considerable interest of scientists, research institutions, firms and the public at large. There was hardly any national or international conference where this programme did not play a major role. The later "100.000 Roofs PV Programme", put into force on the initiative of the German Federal Deputy, Mr. Scheer, largely built on the results of the "Thousand Roofs PV Programme".

I also contributed substantially to the "250 MW Wind Programme", which was at the origin of the German wind power development with an installed capacity in 2004 of more than 13.000 MW. Furthermore I elaborated the "ELDORADO Programme", under which PV and wind power plants in eight selected developing countries were supported, among them Brazil, China and Indonesia.

In September 1996 I was appointed Head of the Division for International Nuclear Organisations. This Division was transferred in December 1998 to the Federal Ministry of Economics and Labour, where I am still active.



Prof. Adolf Goetzberger

Awarded with the Becquerel Prize in 1997 on the occasion of the 14th European Photovoltaic Solar Energy Conference in Barcelona / Spain.

Curriculum vitae

A. Goetzberger received his Dr. rer. nat. degree in Physics from the University of Munich in 1955. He spent 10 years in the USA – five years with the Shockley Transistor Laboratory, Palo Alto, CA. and five years with Bell Telephone Laboratories, Murray Hill, NJ, where he published fundamental work about the Si-SiO₂-interface. In 1968, he returned to Germany to accept the position as Director of the Fraunhofer Institute for Applied Solid State Physics. He modernized and greatly expanded this institute. In 1981, he founded the Fraunhofer Institute for Solar Energy Systems in Freiburg which grew into one of the major solar energy laboratories in Europe. The institute is engaged in a broad spectrum of work in most aspects of solar energy conversion. Solar cell technology, solar materials research, thermal conversion, systems engineering and energy storage are the main activities.

In 1993, he retired as a director of the institute but he carries on many publishing and advisory activities in the field of solar energy.

Scientific achievements: Fluorescent solar collectors, first theory of light trapping in thin silicon solar cells by diffuse reflectors, development of transparent insulation for buildings, planning and construction of the first self-sufficient grid independent solar house in Germany in 1992. Many patents in photovoltaics, thermal solar energy, daylighting and systems.



He was President of the International Solar Energy Society from 1991-1993. He served on the Board of this society from 1987 to 1999 and since 2000 as an Honorary Director. From 1993 to 1997 he was President of the German Solar Energy Society DGS. He is now Honorary President of this society. He is a fellow of IEEE.

In 1995, he became Doctor Honoris Causa of the Uppsala University in Sweden. He is on the International Advisory Boards of all three International Photovoltaic Conferences. Presently he is a member of the EU High Level Advisory Board on Photovoltaics.

He received the German Cross of Merit First Class and the Medal of Merit of the State of Baden-Württemberg.

He is Honorary President of the German Solar Energy Society and Honorary Director of the International Solar Energy Society.

International Awards

1983

J. J. Ebers Award of the IEEE-Electron Devices Society

1995

Daniel Farrington Award of the International Solar Energy Society

1997, May

Karl W. Boer Solar Energy Medal of Merit Award

1997, July

Alexandre Edmond Becquerel Prize of the European Commission

1997, Sept

William R. Cherry Award of the IEEE

Dr. Karlheinz Krebs

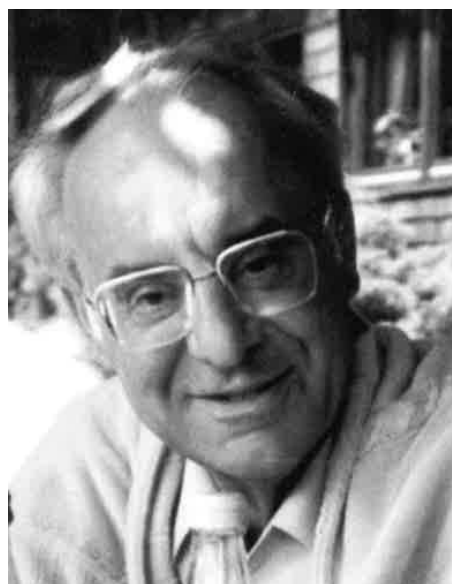
Awarded with the Becquerel Prize in 1995 on the occasion of the 13th European Photovoltaic Solar Energy Conference in Nice / France.

Curriculum vitae

Karlheinz Krebs stood out in the history of the European Photovoltaics as one of its heroes, committing his career and his life to the promotion of this noble task, even when his direct working environment was unfavourable or hostile.

He was born in Freiburg, Germany, where he also concluded his studies in physics with a Ph.D. After a postdoc at the Imperial College in London and a professorship at UCLA in California, he returned to Europe and started in 1960 a long career of 34 years at the EU Commission's Joint Research Centre in Ispra, Italy. In the spirit of that time, it was started as a nuclear research centre and so was Karlheinz's work first devoted to neutron physics. It was crowned with 7 patents and 25 scientific articles.

At the beginning of the 1970s, he turned vigorously to the development of solar energy. First, he initiated important work on solar concentrators for photovoltaics and had a group of co-workers building and experimenting with practical systems. It was typical for him not to stop with studies, but to build and make things happen!



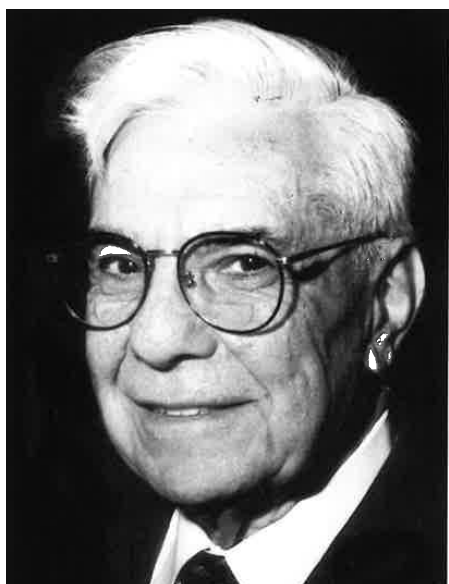
Since the mid-1970s, he started to build ESTI and to develop methodologies for standards and testing of PV cells and modules, for which his laboratory became a pioneer in Europe and worldwide.

In 1974, the Commission's first Renewable Energy programme was drafted. Karlheinz Krebs and Wolfgang Palz were the only delegates interested to draft the PV part of the programme. And that is what they realized in the end.

Karlheinz Krebs received the Becquerel Prize for his outstanding merits for European PV, just a few months after he passed away in 1995.

Dr. Morton Prince

Awarded with the Becquerel Prize in 1994 on the occasion of the 12th European Photovoltaic Solar Energy Conference in Amsterdam / The Netherlands.



Curriculum vitae

Morton B. Prince was born in Philadelphia, Pennsylvania on April 1, 1924 and attended the school system in the same city. He received his Bachelor of Arts degree from Temple University in 1947 with a major in physics and a Ph.D. in Physics in 1951 from the Massachusetts Institute of Technology. Upon receiving his Ph.D., he joined the Bell Telephone Laboratories (BTL) in Murray Hill, New Jersey, working under Dr. William Shockley, carrying out studies in the properties of germanium and silicon, and analyzed the physical properties of the new grown p-n junction germanium transistors. In 1953, he started to work on semiconductor devices in Dr. Jack Morton's device development department where he participated in the analysis and experimental development and improvement of the newly "invented" Bell Solar Battery. He developed a diffusion technique for producing junctions in silicon without destroying the minority carrier lifetime in the material (Patent No. 2, 790, 940). This allowed him to develop an extremely efficient silicon (conductivity modulated) power rectifier using a p-i-n structure for which he received a major publicity release. Other significant devices that he developed include a high frequency silicon diode and a family of diffused silicon Zener diodes. Among his many papers published during his time with the BTL, his paper entitled "Silicon Solar Energy Converters" published in May 1955, in the Journal of Applied Physics, remains the most relevant to photovoltaics.

In 1956, he joined the Hoffman Electronics Corporation, Semiconductor Division, initially as Director of Research and Development, where he helped to commercialize the products he was involved with at the BTL.

This department started with five members and grew to approximately 100 technical personnel (including Martin Wolf, Gene Ralph, Hans Rauchenbach and Bernd Ross) within four years and included work on semiconductor materials and techniques, semiconductor device development and semiconductor device applications. It was in 1957 that his organization showed the Vanguard Satellite engineers the potential for using solar cells for space power. The Vanguard people were convinced and incorporated Hoffman (the only producer at that time) cells in the first space satellite powered by solar cells (it was launched on March 17, 1958).

Hoffman developed a special sized cell for this application and produced solar cell modules for many satellites and probes after that time. In 1960, Dr. Prince became Division Manager and Corporate Vice-President and was responsible for overall administrative, technical, marketing, manufacturing and financial operations of the Semiconductor Division, encompassing two separate plants, employing more than 1,000 employees. The solar cell efficiency grew from 8% in 1957 to 14% in 1960, by incorporating many new techniques in both material production and device design. Probably, the most important development was the gridded contact on the front of the cell. In 1960, he co-organized the first Photovoltaic Conference in Los Angeles, to bring together researchers and engineers in industry, universities and government laboratories to develop standards for the measurement of solar cells. This preceded the start of the regular IEEE Photovoltaic Specialists Conference.

After leaving Hoffmann, he became involved in other activities including his own organization that developed and produced photon counting equipment. However,

in 1975, when the Energy Research and Development Administration (ERDA-later the Department of Energy) was started, he was invited to join the organization to lead the photovoltaic section and was responsible for planning, funding and monitoring the Federal Photovoltaic Program. The funding of this program grew from \$5,000,000 in 1975 to \$150,000,000 in 1980 and he stimulated many successful solar cell developments by giving technical and managerial guidance. During the 1980s, with a decreasing interest in solar energy in the U.S. government, the annual budgets dropped dramatically and he held together as much of the program as possible. However, he felt badly about losing many excellent laboratories and individual researchers to the program due to the budgetary limitations. Dr. Prince retired from the program in 1993.

Dr. Prince was the editor of Volume 8 of "Advances in Solar Energy", published chapters in five books, published fourteen peer-reviewed papers, presented thirty-five conference papers and gave twenty-eight invited talks. In addition to the Becquerel Prize of the European Commission in 1994, he was awarded the Marconi Premium of the British Institute of Radio Engineers in 1958 for a paper on solar cells.

He served on various committees for many organizations, including the Institute of Radio Engineers, American Institute of Aeronautics and Astronautics, WESCON, Institute of Electrical and Electronic Engineers and American Solar Energy Society. He is still a member of IEEE (Fellow), American Physical Society and International Solar Energy Society.

Prof. Antonio Luque

Awarded with the Becquerel Prize in 1992 on the occasion of the 11th European Photovoltaic Solar Energy Conference in Montreux / Switzerland.

Curriculum vitae

Prof. Antonio Luque, born in Malaga, Spain, in 1941, is Dr. Engineer in Telecommunication from the Technical University of Madrid. His doctor thesis was in the field of lasers and he built the first laser in Spain in 1966. Later on, in 1969, he installed a Laboratory of Semiconductors at his University, again the first in Spain with the capacity for device manufacturing. He is Full Professor of Electronic Technology at the Technical University of Madrid since 1970, where he leads the Institute of Solar Energy which he founded in 1979, based in the Laboratory of Semiconductors.

Since 1975, Prof. Luque's research activity is mainly devoted to the photovoltaic conversion of solar energy. He invented the bifacial cell in 1976. This cell was fabricated by Isofotón, a company he created in 1981, today in the world top ten and present in more than 40 countries. More recently, Prof. Luque has proposed the new mid-gap band solar cell and is working in demonstrating this concept experimentally. This concept might overcome fundamental efficiency limitations of conventional solar cells and has attracted numerous researchers all over the world. He has published more than 200 scientific papers in English, as well as some books and holds 12 patents, 6 of them in exploitation.

Prof. Luque has obtained, among others, Spanish National Prizes for Technology Research in 1989 and for Technology Transfer in 2003, both granted by the King of Spain every 2 years, the King James I Award to environmental research delivered by the Crown Prince in 1999 and the Alexander-Edmond Becquerel Prize in PV research, granted by the EC in 1992. He is member of the Royal Academy of Engineering of Spain since 1994 and Member of Honour of the Ioffe Physico-Technical Institute of St. Petersburg since 2003.



Prof. Dr.-Ing. Werner H. Bloss

Awarded with the Becquerel Prize in 1991 on the occasion of the 10th European Photovoltaic Solar Energy Conference in Lisbon / Portugal.

Curriculum vitae

Werner H. Bloss, born in 1930 at Winterbach near Stuttgart, Germany, studied Physics at the Universities of Tübingen and Stuttgart. In 1955 he joined the Institute of Gas Discharge Techniques and Photoelectronics of the University of Stuttgart. Already in his doctoral thesis he treated a matter related to unconventional energy conversion: thermionic converters. In continuation, as a postdoctoral thesis he published the book "Elektronische Energiewandler". From 1967 to 1970 he took the position of a Visiting Professor at the University of Gainesville, Florida, USA. During this period he focussed his interest on optical image processing, but simultaneously continued to observe the field of energy conversion, especially renewable energies.

After returning from the USA, he was appointed in 1970 to the chair of his former Institute at the University of Stuttgart, which he renamed in "Institute of Physical Electronics".

He started with a group of 15 co-workers, but within a few years he succeeded in establishing new research fields and to enter into close relationships in the national and international research scenery. The maxim of actions was always to initiate research activities that are oriented to the benefit of society. In this sense he focussed the efforts of the Institute on optical and digital image processing with applications in medicine, diagnostics of spark ignition and combustion, finally contributing to the benefit of environment, and photovoltaics, especially thin-film solar cells, as a technology for renewable energy usage. Due his initiative and commitment the Institute gained high international reputation in all fields treated by himself and his co-workers.

Due to his attitude, he did not persist in the ivory tower of pure science, but cultivated excellent contacts to industry, and he took technology transfer for granted.

During his directorship the number of co-workers of the Institute rose to 50 and the annual third-party income was in the range five to eight millions of DM.

Besides his activities at the Institute, Professor Bloss was one of the initiators of the German-Saudi Arabian HYSOLARproject, with the goal of solar hydrogen production and use, and further inter-institutional research activities in this field. Furthermore, he was the founder and the first Director of the Center of Solar Energy and Hydrogen Research Baden-Württemberg, a foundation of public interest, that meanwhile developed into one of the most prominent solar energy research centres in Germany.

In addition, Professor Bloss was very committed in consulting activities in a number of national and international boards, which cannot be listed up here.

His activities and his merits have been honoured in 1989 by the Solar Prize of the German section of ISES, in 1990 by the First Class Order of the Federal republic of Germany, and in 1991 by the Becquerel Prize of the Commission of the European Communities.

In February 1995, Professor Bloss got emeritus status, and, to the sorrow of all of us, he died in June 1995.



Prof. Roger Van Overstraeten

Awarded with the Becquerel Prize in 1989 on the occasion of the 9th European Photovoltaic Solar Energy Conference in Freiburg / Germany.

Curriculum vitae

Roger Baron Van Overstraeten, born 7.12.1937, in Vlezenbeek, Belgium, deceased, 29.4.1999, Leuven, Belgium.

Roger Van Overstraeten obtained his engineering degree in electronics and in mechanics from the Katholieke Universiteit Leuven, Belgium, 1960. In 1960, he received a BAEF fellowship to study in the USA. In 1963, he obtained a Ph.D. degree in Physical Electronics at Stanford University. Professor at the Katholieke Universiteit Leuven since 1965. Founder and director (until 1984) of the laboratory E.S.A.T. (Electronics, Systems, Automation, Technology) at the Katholieke Universiteit Leuven. Since 1984, he was President of the Interuniversity Microelectronics Laboratory IMEC v.z.w. in Leuven, Belgium.

Professor R. Van Overstraeten was author or co-author of more than 100 papers in scientific journals. His contributions were mainly in the field of physical electronics and of PV.

He was General Chairman or Technical Chairman of several International Conferences. He was a fellow of IEEE (Institute of Electrical and Electronical Engineers, Inc.) and member of the Belgium Royal Academy of Sciences.

He was member of the Board of Directors of several companies.

- Insead Innovator Prize, 1986
- Honorary Doctoral Degree I.N.P.G., Grenoble, France, 1987
- Becquerel Prize, 1989
- Flanders Technology International Innovation Award, 1991
- Semi-Award, 1994
- IEEE Frederik Philips Award, 1999



Bylaws of the Becquerel Prize Committee

Status February 2015

1. The Alexandre Edmond Becquerel Prize was established in 1989 by the European Commission at the occasion of the 150th anniversary of Becquerel's classical experiment in which he discovered the photovoltaic effect. Its purpose is to honour scientific, technical or managerial merit in the development of photovoltaic solar energy, attained over a long period of continuous achievements, or very exceptionally, for some extraordinary invention or discovery. It is primarily a European Award but not restricted exclusively to European citizens.
2. The Prize is awarded periodically to a single individual. The prize cannot be awarded posthumously. The Prize cannot be shared nor given to an institution or team.
3. This periodicity is linked to the European Photovoltaic Solar Energy Conference, of one year, at whose opening the Prize shall be awarded in a solemn ceremony.
4. The Becquerel Prize is granted by the European Commission and awarded in the name of the European Photovoltaic community at the annual European Photovoltaic Solar Energy Conference. The Becquerel Prize Committee selects the individual to be honoured with the prize. The Committee must maintain the spirit of the prize, implementing the necessary modifications to the bylaws to insure in perpetuity the selection of appropriate candidates.
5. This committee is formed by: (a) all the past awardees, (b) the Chairperson of the European Photovoltaic Solar Energy Conference where the prize will be awarded, (c) one representative of the European Commission, (d) the organiser of the conference where the prize will be awarded.
6. The Committee is chaired by one of the past awardees. He/she must be elected by the Committee after the annual awards ceremony of the prize. His/her term will expire after the next awards ceremony. The Chairperson can be re-elected.
7. With the exception of changes of the bylaws any decision of the committee must be taken by the majority of votes among all members participating in the vote with the Chairperson's vote deciding in case of a tie between opposite options. Assemblies and voting can be held without physical presence, but the usual rules of information and debate held in assemblies with physical presence must be respected in all cases. Secret votes are forbidden for the committee members. Changes of the bylaws have to be approved by a two thirds majority of votes among all members participating in the vote. The chairperson announces the meeting of the committee which will normally be held at the annual European Photovoltaic Solar Energy Conference after the awards ceremony.
8. The Becquerel Prize consists of a diploma including a short notice of the Alexandre Edmond Becquerel germinal achievement in photovoltaics. It must also mention the edition of the Prize, the awardee's name and affiliation and a mention of the award motivation. If possible it must be complemented by a check. The diploma will be signed by a Commission Representative and the chair of the Becquerel committee.
9. The prize is announced publicly for submission of proposals for new candidates together with the announcement of the conference. Proposals should be addressed to the awards chair. The announcement to the PV community shall be made in a broad way; at least via the website of the conference where the prize is granted and via the website of the Becquerel Prize Committee. Proposals of new candidates have to be accompanied by a justification including a list of

scientific and technical publications and/or achievements in the area of photovoltaics as well as a curriculum vitae of the proposed candidate. The Becquerel Committee screens the proposals and identifies by means of the procedure outlined in section 10 candidates who may in principle become Becquerel Prize awardees. In the context of these bylaws these persons are called “nominees”.

10. Approximately five months before the Prize ceremony the awards chair sends all received proposals for new candidates including the additional information (section 9) to the Prize committee for evaluation. All proposals that are supported by at least 25% of the members of the Committee participating in the voting are regarded as nominees and are added to the existing list of nominees, as carried forward from the preceding year. In this procedure each individual member of the committee may vote for one or several proposals submitted according to section 9. The awards chair will distribute the updated list of existing nominees before each Committee meeting (section 7) to all Committee Members.

11. Approximately four months before the Prize ceremony the awards chair initiates a first vote. The members of the committee may vote for three different nominees from the list of nominees (section 10). Those nominees who receive zero votes during this procedure are taken off from the list of nominees.

12. Approximately three months before the Prize ceremony the awards chair prepares a list for a second voting. This list contains candidates who have received the highest number of votes in the first voting process. The chair will then submit this list to the committee for the second vote. The procedure for the voting is laid down in section 7; the criteria are defined in section 1 and 9.

13. In the case that one candidate of the second voting process receives the majority of the votes cast he/she is the winner of the Becquerel Prize. If none of the candidates receives the majority of the votes in the second voting a third voting will be initiated by the awards chair. For the third and final vote the awards chair prepares a list with the two candidates (or more if there are ties) who have received the highest number of votes in the second voting process. The chair will then submit this list to the committee for the final vote. The procedure for the voting is laid down in section 7; the criteria are defined in section 1 and 9.

14. The ceremony should consist of a Laudatio of the awardee. The Laudator shall be chosen by the Becquerel Prize Committee Chairperson, usually at the suggestion of the awardee, followed by the offering of the award itself, by a Commission Representative, and finally by a keynote speech given by the awardee.

15. The awardee will be notified of his/her selection by a letter jointly signed by a Commission Representative and the Becquerel Prize Committee Chairperson at the latest two months before the ceremony. At this time the awardee's name should be published on the websites of the Becquerel Prize Committee and of the Conference. Moreover, the awardee and his or her lecture should be announced in the printed conference program.

February 2015

Prof. Joachim Luther
Chairman of the Becquerel Prize Committee



Editor

This brochure was produced on behalf of the Becquerel Prize Committee.

www.becquerel-prize.eu

Compilation of texts and responsibility:

Joachim Luther, Chairman of the Becquerel Prize Committee

Digitalization of the printed texts 1989–2004

by NET Nowak Energy & Technology

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Layout

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Photo Acknowledgement

cover background image: © istock.com / zhaojiankang

small cover images: © Fraunhofer ISE

page 27: © Botond Horvath / shutterstock.com



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This brochure was published on the occasion of the 35th European PV Solar Energy Conference and Exhibition, 24–28 September 2018 in Brussels, Belgium.
www.photovoltaic-conference.com