Preface

Leif Hammarström, Sven Kullander

This Special Report of AMBIO contains the proceedings of the JSPS-RSAS Joint Conference *Capturing the Sun* that was held at the Royal Swedish Academy of Sciences (RSAS) in Stockholm, May 30–31, 2011. The idea of a conference with this theme emerged as a result of discussions in 2010 between Professor Gunnar Öquist, the RSAS permanent secretary at that time, and Professor Hiroshi Sano, Director for the Stockholm office of JSPS, the Japan Society for the Promotion of Science. The office wanted to celebrate its 10th anniversary with a special event and suggested a joint symposium with RSAS. Professor Öquist, aware of the work of the RSAS Energy Committee, the high standing of Japanese research on solar energy, and with his own interest in the photosynthesis, suggested a symposium on solar energy with the title *Capturing the Sun*. Professor Sano liked the suggestion and the planning of the symposium could begin. The Energy Committee assisted by the Stockholm JSPS office and the RSAS info group served as the Organizing Committee for the symposium. The Swedish solar energy platform and Professor Leif Hammarström advised the Committee on the scientific content. Thanks to these coordinated efforts, leading Japanese and Swedish scientists could come together and discuss the state of solar energy research.

During the joint conference, overviews of the situation in the two countries covering basic and applied research as well as industrial developments were given. A general session and six topical sessions covered different aspects of solar production of electricity, heat, and fuels. The symposium was introduced by the present RSAS permanent secretary, Professor Staffan Normark, Professor Öquist and the JSPS president, Professor Motoyuki Ono. In addition to the oral presentations there were a number of poster presentations. The different sessions were chaired by members of the RSAS Energy Committee; Professors Harry Frank,

Sven Kullander, Olle Inganäs, Elisabeth Rachlew, Ingmar Grenthe, Rickard Lundin, Bertil Fredholm, Lennart Bengtsson, and Dr. Karl Grandin,

The proceedings of the joint JSPS-RSAS conference are published in this AMBIO Special Report and include oral presentations as well as one of the poster presentations. The presentation by Professor Robert Pitz-Paal on concentrating solar power viewed from a European horizon is not included but it was essentially based on a recent EASAC report, which can be found at <http://www.easac.eu>.

We believe that the Special Report will provide a valuable, condensed and up-to-date overview of solar energy, as well as more specialized articles, with a focus on Japan and Sweden. We also believe that the Report will be useful and accessible for a broader audience of scientists in all areas, experts at ministries and agencies, science journalists etc.

We acknowledge a constructive interaction with all the authors of the report. We are also grateful to the staff at the JSPS Stockholm office, Dr. Hiroshi Sano, Ms. Yuko Kamoshita, Ms. Naomi Yoshizawa, Mr. Kazutoshi Ono, Ms. Lisa-Mi Swartz, and at the RSAS, Dr. Dick Hedberg, Ms. Sophia Westlund, Dr. Magnus Lundgren, Dr. Erik Huss for the administrative help. Finally, the generous support from the JSPS is gratefully acknowledged.

Leif Hammarström (✉)

Address: Photochemistry and Molecular Science, Department of Chemistry—Ångström Laboratory, Uppsala University, P.O. Box 523, 751 20 Uppsala, Sweden.
e-mail: leif.hammarstrom@kemi.uu.se

Sven Kullander

Address: Royal Swedish Academy of Sciences, P.O. Box 50005, 104 05 Stockholm, Sweden.
e-mail: sven.kullander@kva.se

JSPS-RSAS Joint Conference
"Capturing the Sun"
 30-31 May, 2011 Beijer Hall, RSAS, Stockholm, Sweden

Programme (The sessions will be chaired by members of the RSAS Energy Committee)

May 30, 2011

Registration (9.00-9.30)

Welcome Address (9.30-9.50)

Staffan Normark, RSAS Permanent Secretary
 Motoyuki Ono, JSPS President
 Gunnar Öquist, RSAS former Permanent Secretary and Umeå University

General (9.50-12.20)

Leif Hammarström (Uppsala Univ.) *The Swedish solar energy platform*
 Yoshiaki Nakano (The Univ. of Tokyo) *Ultra-high efficiency photovoltaic cells for large scale solar power generation*

Joakim Byström (Absolicon Corp.) *Solar concentrators for heat and electricity*
 Marika Edoff (Uppsala Univ.) *Thin film solar cell research in an industrial perspective*

Session 1: Solar Cells based on Nanotechnology (14.00-15.00)

Takashi Fukui (Hokkaido Univ.) *Semiconductor nanowires and their photovoltaic applications*
 Lars Samuelson (Lund Univ.) *Novel ways to fabricate solar cells based on semiconductor nanowires*

Session 2: Organic (Polymer) Solar Cells (15.30-17.00)

Shinzaburo Ito (Kyoto Univ.) *Spectroscopic analysis of NIR-dye-sensitization in bulk heterojunction polymer solar cells*

Olle Inganäs (Linköping Univ.) *Alternating copolymers and alternative geometries for polymer photovoltaics*

Villy Sundström (Lund Univ.) *Nanostructured organic and dye-sensitized materials for solar energy conversion – the light to charge processes*

May 31, 2011

Session 3: Grätzel Cells (9.00-11.20)

Hironori Arakawa (Tokyo Univ. of Science) *Toward development of efficient and stable dye-sensitized solar cell modules*

Ryuzi Katoh (AIST) *Charge generation and recombination in nano-structured TiO₂ films*

Anders Hagfeldt (Uppsala Univ.) *Title (TBD)*

Licheng Sun (KTH) *From dye sensitized solar cells to molecular solar fuels*

Session 4: Solar Fuels (Photosynthesis and artificial photosynthesis) (12.30-14.00)

Kazunari Domen (Univ. of Tokyo) *Hydrogen production from water on heterogeneous photocatalysts*

Stenbjörn Styring (Uppsala Univ.) *Artificial photosynthesis (TBD)*

Johannes Messinger (Umeå Univ.) *Structure and function of the water-oxidizing complex in photosystem II*

Session 5: Solar Fuels (Photobiological systems) (14.20-15.20)

Hajime Masukawa (JST/Kanagawa Univ.) *Genetic engineering of cyanobacteria to enhance biohydrogen production from sunlight and water*

Peter Lindblad (Uppsala Univ.) *Design, engineering and construction of photosynthetic cell factories for renewable solar fuel production*

Session 6: Solar Concentration (Electricity and Solar Fuels) (15.40-16.40)

Yutaka Tamaura (Tokyo Inst. of Tech.) *Conversion of concentrated solar thermal energy into chemical energy*

Robert Pitz-Paal (DLR Solar Research) *Optimizing concentrating solar power technology*

Closing Session (16.40-17.00)

Sven Kullander (Chairman RSAS Energy Committee)

Photo: Nasa

The symposium is free of charge and open to the public.

Registration is required and must be made before **15 May 2011**.

Register at <http://kva.se> > Kalendarium/Events > "Capturing the Sun".