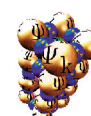




The Abdus Salam
International Centre
for Theoretical Physics
50th Anniversary 1964 - 2014



EUROPEAN
SCIENCE
FOUNDATION

Materials Challenges in Devices for Fuel Solar Production and Employment

(19 - 23 May 2014)

The Abdus Salam International Centre for Theoretical Physics (ICTP)
Trieste, Italy

This workshop will analyze the state of the art in the field of materials for photoelectrochemical and fuel cells, identifying its most pressing problems and most promising solutions. Our main focus will be on elementary atomic-scale mechanisms underpinning physico-chemical and solid-state processes such as photo-induced water splitting and vacancy and excess charge transport, and their computational modeling by current state of the art and foreseeable new tools.

The topics will include:

Devices for solar fuel production;
Fuel cells;
Water splitting;
Photo-, electro- and thermo-catalytic conversion of CO₂ to hydrocarbon fuels;
Photoabsorption and charge separation;
Electronic and ionic transport;
Heat generation and transport;
Thermo-mechanical stability of interfaces and contacts;
Computational modeling of materials for the production of solar fuels and for fuel cells.

The production and distribution of energy from renewable sources are key components of sustainable development posing significant challenges as renewable sources have relatively low energy density and are not time-correlated with energy demand. Efficient storage becomes thus necessary -e.g., by converting solar into chemical energy in the form of hydrocarbons- and conversion efficiency becomes a key issue. Moving from production to end-usage, the efficiency of standard fuel to energy conversion technologies has also been traditionally low. Photoelectrochemical and fuel cells are deemed to offer a promising chance to carry out these tasks efficiently. This state of affairs has generated a considerable research effort, also stimulated by our limited understanding of the elementary processes at the core of these technologies.

Our central aim is to discuss the recent progress and identify the main open materials challenges in the current research on devices for solar production of fuels and fuel re-conversion into electric potential energy. The workshop will focus on the investigation of elementary processes such as photoabsorption, (photo-)catalytic reactions, electronic and ionic transport, and their relation with the materials properties, most relevant for overall performance. Regarding photoelectrochemical and fuel cells, attention will be devoted both to physico-chemical problems affecting the electrode/electrolyte interface, and to materials challenges at the electrode. These will involve phenomena such as excess charge transport, vacancy transport, proton transport as well as structural stability issues.

PARTICIPATION:

Scientists and students from all countries that are members of the United Nations, UNESCO or IAEA may attend. As the event will be conducted in English, participants should have an adequate working knowledge of this language. Although, the main purpose of the Centre is to help research workers from developing countries, through a programme of training activities within a framework of international cooperation, a limited number of students and post-doctoral scientists from developed countries are also welcome to attend. As a rule, travel and subsistence expenses of the participants should be borne by their home institution. Every effort should be made by candidates to secure support for their fare. Very limited funds are available for partial support of some participants, who are nationals of, and working in, a developing country, and who are not more than 45 years old. Such support is available only for those who attend the entire Workshop. There is no registration fee for attending this activity.

HOW TO APPLY FOR PARTICIPATION

Applicants should apply using the ICTP online system available at the website http://cdsagenda5.ictp.trieste.it/full_display.php?agenda_id=4304. Once in the website, comprehensive instructions will guide you step-by-step on how to fill out and submit the Application Form.

Deadline for Applications:

1 FEBRUARY 2014 (if financial support or visa is required)

1 APRIL 2014 for all other applicants

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ICTP Home page: <http://www.ictp.it/>

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