



WMRIF

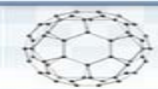
世界材料研究所フォーラム

World Materials Research Institutes Forum

Materials Challenges for Clean Energy:

Challenges, Approaches and Opportunities

Brief Summary of symposium



3rd World Materials Research Institute Forum

Symposium on Materials Challenges for Clean Energy

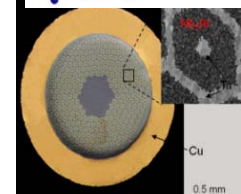
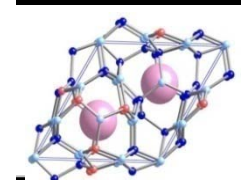
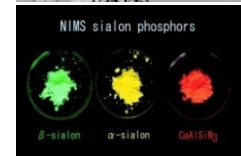
June 22nd (Mon)~23rd (Tues), 2009

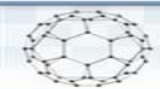
at National Institute of Standards and Technology
(NIST, Gaithersburg Md. USA)

- Sessions: 1. Energy/Materials Overview (DOE, EU, Asia)
- 2. Materials Technologies for Solar Energy
- 3. Hydrogen and Bio-fuels
- 4. Energy Storage and Conversion Materials
- 5. Materials for Energy Efficiency
- 6. Nuclear (fission, fusion and materials)

For details

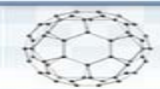
<http://www.e-materials.net/network/WMRIF//modules/wordpress/>





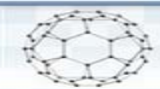
Materials Challenges for Clean Energy: Challenges, Approaches and Opportunities

- **Session 1: Overviews**
 - **Need for novel approaches to materials challenges**
 - Transformational/discovery approaches
 - Integration with further development
 - Deployment for societal benefit
 - **Differing approaches to similar goals**
 - Development/deployment after discovery
 - Targeted research
 - Integration with national and international breadth
 - **Challenges beyond technical hurdles**
 - Identify and accept important challenges
 - Return high value for resources received
 - Communicate progress and results



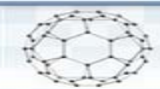
Materials Challenges for Clean Energy: Challenges, Approaches and Opportunities

- **Session 2: Solar Energy Materials**
 - **Widely recognized as transformational technology**
 - **Multiple technical approaches actively investigated**
 - Dye-sensitized cells
 - Organic hetero-junction cells
 - Thin-film and bulk inorganic semiconductors
 - **Importance of team efforts**
 - Integrating technology with users/customers
 - Focus on realistic cost/benefit targets
 - Value of major facilities/teams



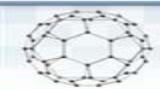
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- **Session 3: Hydrogen and Biofuels**
 - **Central role of energy carriers**
 - Link from solar (bio, PV) to distant/mobile end uses
 - **Safety clearly important to acceptance for hydrogen**
 - Not strictly a technical cost/benefit technology
 - **Importance of fundamental interactions**
 - Storage in glass-capillary matrices
 - Fundamentals of catalysis and separations
 - Thinking broadly – relationships between storage and potential reactions (storage media to chemical fuels)



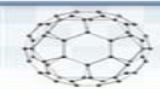
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- **Session 4: Energy Storage and Conversion**
 - **Key to realistic expansion of renewables to grid**
 - **Safety through materials selection**
 - **Challenges of “free” resources**
 - **Costs and issues in geothermal utilization**
 - **Discoveries enabling technologies**
 - **Importance of emphasis (renewal of thermoelectric research)**
 - **Value of multiple approaches (solar PV + thermal)**
 - **Theory, Modeling and Simulation as a research tool**
 - **Predictions from first principles**
 - **Importance of interfaces**



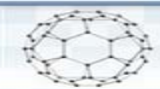
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- **Session 5: Materials for Energy Efficiency**
 - **Span the range**
 - **Safety through materials selection**
 - **Challenges of “free” resources**
 - **Costs and issues in geothermal utilization**
 - **Discoveries enabling technologies**
 - **Importance of emphasis (renewal of thermoelectric research)**
 - **Value of multiple approaches (solar PV + thermal)**
 - **Theory, Modeling and Simulation as a research tool**
 - **Predictions from first principles**
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**Materials Challenges for Clean Energy:
Challenges, Approaches and Opportunities**

- **Session 6: MSE for Nuclear Energy as a countable mean to reduce GHG**
 - **Session Theme: Evolutionary and Revolutionary Development of Structural Materials**
 - **Outline**
 - **Discussion from the viewpoints of reactor materials, the reactor reliability and safety.**
 - **MSE plays a significant role using computer science.**
 - **Conventional materials could be revived a prime candidates by applying new technologies.**
 - **The time schedule for fusion reactors has been set to meet the societal goal of GHG.**
 - **The employment of low-radioactivity alloys for even cleaner system become viable.**
 - **The lifetime extension as well as safety management of the reactor systems are vital and development of non-destructive methods is the key to the goal.**



**Materials Challenges for Clean Energy:
Challenges, Approaches and Opportunities**

All sessions

- Rapid advances in broad areas**
- New materials are driving new concepts**
- Computational science is making real contributions along with nano-technology**
- Interactions between major facilities and new ideas**
- Surface- and boundary-science for R&D of new energy**
- MSE's contribution are expected for the higher efficiency of conventional energy and its usage**

(Presentations placed on web site)

Summary for Future actions

One of the most important tasks of the symposium to provide the general assembly with the followings:

1. Common understandings of the present state of the art
 - (1) Presentation of the portfolios among different fields.
 - (2) Construction of Researcher's map.
 - (3) Review and outlook of major technology of E&E materials. (see **WMRIF-web :ex. MRS, NIMS etc**)
2. Mutual exchange and improvement of MSE strategy of E&E
 - (1) Presentation of MSE strategy (in E&E of each institute). (see **WMRIF-web :Presentation of each MRI**)
 - (2) Contribution of strategy for the global collaboration. (**Theme for the round table discussion**)
3. MSE's contribution to mitigating GHG emission (**Need to summarize the items**)
 - (1) Presentation of major R&D items of MSE in E&E
 - (2) Contribution in terms of the reduction of GHG emission.
4. Funding or R&D proposals taking advantage of WMRIF are desired, in accordance with the on-going programs (=> General assembly (**Theme for the round table discussion**)).