清洁能源国际研讨会 2010

International Forum on Clean Energy

August 17-19, 2010

Hefei, China

Sponsored by

International Center for Quantum Design of Functional Materials

Hefei National Laboratory for Physical Sciences at the Microscale

University of Science and Technology of China

Contents of the Manual

Scopes and Objectives of the Forum

This meeting is designed to provide a unique and open forum for exchange of ideas and visions from leaders, representing three different perspectives, who are engaged in the science and technology for clean energy. The first group consists of technical leaders from industry, covering fossil, nuclear and solar energy, who will collectively assess the current status and critical scientific needs from their perspective. The second group consists of leaders from several major countries who are policy/decision makers and will highlight strategic plans and investments in clean energy at the national and institutional levels. The third group consists of science leaders who will critically review the state of the art in several cornerstone areas of science for clean energy, including advanced photovoltaic and battery materials, nanoscale catalysis, plasmonic materials, and solar-assisted hydrogen production and storage. The ultimate goal of the forum is to bridge the different sectors of expertise through open discussion, in order to identify the most pressing challenges that the industry faces, and in so doing, to help define future research directions for the scientific community to address these challenges from the real world.

Forum Organization

Co-Chairs

Hou, Jianguo	President, University of Science and Technology of China (USTC), China
Zhang, Zhenyu	Oak Ridge National Laboratory & University of Tennessee, USA & USTC, China

International Program Committee

Chair:	Li, Jinghai	Vice President, Chinese Academy of Sciences, China
Co-chair:	Zhang, Zhenyu	Oak Ridge National Laboratory & University of Tennessee, USA & USTC, China
Members:	Buchanan, Michelle	Oak Ridge National Laboratory, USA
	Chen, Ping	Dalian Institute of Physical Chemistry, CAS, China
	Kaxiras, Efthimios	Harvard University, USA
	Pantelides, Sokrates	Vanderbilt University
	Scheffler, Matthias	Fritz Haber Institute, Max-Planck-Gesellschaft, Germany
	Tian, Zhongqun	Xiamen University, China
	Wang, Enge	IOP & Peking University, China
	Williams, Ellen	British/Beyond Petroleum
	Yang, Jinlong	USTC, China
	Yang, Liyou	Astronergy
	Zhang, Shengbai	Rensselaer Polytechnic Institute, USA

Local Organizing Committee

Chair:	Wang, Xiaoping	USTC
Members:	Cui, Ping	USTC
	Dong, Zhenchao	USTC
	Gong, Xingao	Fudan University
	Li, Zhenyu	USTC
	Lin, Zijing	USTC
	Wang, Bing	USTC
	Wang, Mu	Nanjing University
	Zeng, Changgan	USTC
	Zhao, Jin	USTC

Plenary and Invited Speakers
(in alphabetical order)

Ambrosch-Draxl, Claudia	University of Leoben, Austria
Anderson, James G.	Harvard University, USA
Bao, Xinhe	Dalian Institute of Chemical Physics, CAS, China
Besenbacher, Flemming	University of Aarhus, Denmark
Chen, Ping	Dalian Institute of Chemical Physics, CAS, China
Gong, Xingao	Fudan University, China
Guo, Zhengxiao	University College London, UK
Ihm, Jisoon	Seoul National University, Korea
Kaxiras, Efthimios	EPFL, Switzerland; and Harvard University, USA
Niu, Qiang	Lafarge China
Lin, Zijing	USTC, China
Pantelides, Sokrates	Vanderbilt University, USA
Scheffler, Matthias	Fritz Haber Institute, Max-Planck-Gesellschaft, Germany
Shelykh, Ivan	University of Iceland, Iceland
Tao, Chenggang	University of California, Berkeley, USA
Tian, Zhongqun	Xiamen University, China
Walukiewicz Wladek	Lawrence Berkeley National Laboratory, USA
Wan, Yuanxi	Institute of Plasma Physics, CAS, China
Wang, Bing	USTC, China
Wang, Deliang	USTC, China
Wang, Enge	Peking University; and IOP, CAS, China
Williams, Ellen	CTO, British Petroleum, UK
Xu, Chunye	USTC, China
Zhang, Shengbai	Rensselaer Polytechnic Institute, USA
Zhang, Shouzhu	Director, Physics Division I, NSFC, China
Zhang, Xiang	University of California at Berkeley, USA
Zhang, Zhenyu	Oak Ridge National Laboratory/U of Tennessee/USTC

Agenda of the International Forum on Clean Energy
August 17-19, 2010, Hefei, P. R. China

Venue: Exhibition Hall on the first floor of HFNL building,
University of Science and Technology of China

August 17	
Welcome Remarks 9:00~9:20	Prof. Changfei Zhu (Vice President of USTC) Prof. Xincheng Xie (Director of International Center for Quantum Materials (ICQM), Peking University)
	Plenary Sessions
Session I	Chair: Prof. Zhenchao Dong
9:20~10:05	Science and technology opportunities – an energy industry perspective Ellen Williams (CTO, British Petroleum, UK)
10:05~10:45	Photo Time & Coffee Break
Session II	Chair: Prof. Zhenyu Zhang
10:45~11:30	New concepts and materials for solar power conversion Wladek Walukiewicz (Lawrence Berkeley National Laboratory, USA)
11:30~12:15	Nuclear Energy in China Yuanxi Wan (Institute of Plasma Physics, CAS, China)
12:15~14:30	**Lunch**
Session III	Chair: Prof. Jinlong Yang
14:30~15:15	Strategic Choices for Global Energy: Constraints from Feedbacks in the Climate Structure James G. Anderson (Harvard University, USA)
15:15~16:00	Clean Energy Challenges for Building Materials Qiang Niu (Lafarge China)
16:00~16:20	Coffee Break
	Invited Sessions
Session IV	Adsorption and Splitting of H_2O Chair: Prof. Qian Niu
16:20~16:55	Proton ordering and premelting at ice surface Enge Wang (Peking University; and IOP, CAS, China)
16:55~17:30	Predictive design of advanced materials for solar energy conversion and storage Zhenyu Zhang (Oak Ridge National Laboratory/U of Tennessee/USTC)

18:00	**Banquet**
August 18	**Invited Sessions on Chemical and Catalytic Processes**
Session V	Chair: Prof. Peter Hall
9:00~9:35	Catalysis for Efficient Conversion of Fossil Energy Xinhe Bao (Dalian Institute of Chemical Physics, CAS, China)
9:35~10:10	The role of the nanoscale in nanocatalysis – Explorations using atomic-scale calculations Sokrates Pantelides (Vanderbilt University, USA)
10:10~10:45	Interfaces and Electron Scattering in Nanostructures Chenggang Tao (University of California, Berkeley, USA)
10:45~11:05	Coffee Break
Session VI	Chair: Prof. Matthias Scheffler
11:05~11:40	Molecular Interactions with Nanostructures for Clean Energy Zhengxiao Guo (University College London, UK)
11:40~12:15	What Can First-Principles Theory Contribute to Organic Electronics? Claudia Ambrosch-Draxl (University of Leoben, Austria)
12:15~14:00	**Lunch**
Session VII	Chair: Prof. Flemming Besenbacher
14:00~14:35	Computational design of high-capacity hydrogen storage in porous materials Jisoon Ihm (Seoul National University, Korea)
14:35~15:10	Amidoboranes and Derivatives for Hydrogen Storage Ping Chen (Dalian Institute of Chemical Physics, CAS, China)
15:10~15:45	Carbon-based hydrogen storage: From atomic spillover to the search for optimal metal anchors Shengbai Zhang (Rensselaer Polytechnic Institute, USA)
15:45~16:05	Coffee Break
Session VIII	Chair: Prof. Changgan Zeng
16:05~16:40	Catalytic model systems studied by high-resolution, video-rate Scanning Tunneling Microscopy Flemming Besenbacher (University of Aarhus, Denmark)
16:40~17:15	Atomic resolved photocatalytic reduction of water and methanol using scanning tunneling microscopy Bing Wang (USTC, China)
17:15~17:50	The Materials Gap in Heterogeneous Catalysis

	Matthias Scheffler (Fritz Haber Institute, Max-Planck-Gesellschaft, Germany)
18:00	**Reception**
August 19	**Invited Sessions on Solar Energy and Related Materials**
Session IX	Chair: Prof. Xincheng Xie
9:00~9:35	Theoretical studies of dye-sensitized titania nanostructures for solar energy conversion Efthimios Kaxiras (EPFL, Switzerland; and Harvard University, USA)
9:35~10:10	CZTS Quaternary Semiconductors as Solar Cell Absorber Xingao Gong (Fudan University, China)
10:10~10:45	Solar energy powered smart window Chunye Xu (USTC, China)
10:45~11:05	Coffee Break
Session X	Chair: Prof. Hong Guo
11:05~11:40	Solid oxide fuel cells Zijing Lin (USTC, China)
11:40~12:15	The second generation solar cell CdTe Deliang Wang (USTC)
12:15~14:00	**Lunch**
	Invited Session on Nanoplasmonics
Session XI	Chair: Prof. Mu Wang
14:00~14:35	Metamaterials, Cloaking and Plasmonic Lasers Xiang Zhang (University of California at Berkeley, USA)
14:35~15:10	Novel types of the interface photonic states and their applications Ivan Shelykh (University of Iceland)
15:10~15:45	lasmon-Enhanced Raman Scattering from Various Nanostructures Zhongqun Tian (Xiamen University, China)
Concluding Remarks	Prof. Shouzhu Zhang (Director, Physics Division I, National Science Foundation of China) Prof. Jianguo Hou (President of USTC)

Information for Hotel, Forum and Tour

. Hotel

Sofitel Grand Park Hefei (合肥索菲特明珠国际大酒店)

Address: Fanhua Road, Hefei Economic and Technological Development Zone, Hefei, 230601, P. R. China
Phone: (86)-551-2216688/ 2216699

August 17 Meeting

Visiting participants will be picked up at the center hall of the Sofitel Hotel at **8:30AM.** The meetings will be held in the Exhibition Hall on the first floor of HFNL building.

August 18-19 Meeting

Visiting participants will be picked up at the center hall of the Sofitel Hotel at **8:30AM.** The meetings will be held in the Exhibition Hall on the first floor of HFNL building.

August 20-22 Tour of Huangshan

Start	Visiting participants will be picked up at the center hall of the Sofitel Hotel at **8:00AM** on August 20 and go to Huangshan by bus.
1st day	visit the ancient villages in southern Anhui - Xidi and Hongcun (西递宏村) stay at Huangshan Haizhou Hotel, +86-559-5578989
2nd day	visit Huangshan stay at Bei Hai Hotel, +86-559-5582555
3rd day	watch the sunrise in Huangshan and return back to the Sofitel Hotel from Huangshan on the afternoon of August 22

Yellow Mountain (Huangshan Mountain) Information

Huangshan Mountain in east China's Anhui province is one of China's ten best-known scenic spots. It is characterized by the four wonders, namely, odd-shaped pines, grotesque rock formation, seas of clouds and crystal-clear hot springs. Mount Huangshan is celebrated for having all the features of mountain scenery. Known as the No. 1 mountain under heaven, it features numerous imposing peaks (77 exceed an altitude of 1,000m), forests of stone pillars and evergreen sturdy pines; other features include grotesquely-shaped rocks (many of which are

individually named, such as "pig-headed monk eating water melon"), waterfalls, pools and hot springs. Because of its mists and clouds, natural scenery in the area changes beyond prediction. Xu Xiake, a noted Chinese geologist and traveler in Ming Dynasty, praised Huangshan Mountain as the best of all mountains.

Mount Huangshan was listed as one of the World Natural and Cultural Heritages in 1990. Mount Huangshan extends 40 kilometers from south to north and 30 kilometers from east to west, covering an area of 1200 square kilometers, the highlights of which occupy 154 square kilometers. Huangshan Mountain is a marvel: within an area of 154 square kilometers there is a crowd of peaks, 72 of which have names indicating the shapes they resemble. Lotus, Brightness Top and Celestial Capital are the three major ones, all rising above 1,800 meters above sea level. The mountains are a body of granite, often with vertical joints. Erosion and fracture contributed to shape the rocks into huge columns, giving rise to lofty peaks and deep ravines. When it is cloudy the pinnacles loom in mists as if they were illusionary, while the sun is shining they unfold in all their majesty and splendor. Huangshan Mountain changes its color and appearance with the alternation of seasons. In spring blooming flowers decorate the slopes in a riot of color and fill the valleys with fragrance; in summer you see verdure peaks rising one upon another and hear springs gurgling merrily. Autumn dresses the mountains in red and purple as maples and some other trees are blazing-red; winter turns them into a world of frost and ice with silver boughs and rocks everywhere. Here in Huangshan, pines and rocks are intimately involved with each other, almost every rock has a pine tree growing out of the crevice, and every tree has tortuous and gnarled roots and branches. The still sea of snow-white cloud can suddenly begin to roll and toss, rise or fall, gather or disperse while the peaks emerge and disappear in the clouds like isles in the ocean. So from ancient times it has been frequented by tourists seeking their mystery and admiring their frequented by tourists seeking their mystery and admiring their scenery. They come to the conclusion that the fantastic pines, the grotesque rocks, the sea of clouds and the hot springs are the four major attractions of the Yellow Mountains. As a matter of fact there are marvels almost everywhere, especially in the following scenic areas: Wenquan (Hot Spring), Yupinglou (Jade Screen Tower), Xihai (West Sea), Beihai (North Sea), Yungusi (Cloud Valley Temple) and Songgu'an (Pine Valley Nunnery).

Notes:

1. We will start to travel to Huangshan at **8:00AM** on August 20. We appreciate you for depositing your large luggage to the hotel’s storage before **7:50AM**.

2. Temperature during July:

Hefei City 25~37^{o}C

Huangshan 16~28^{o}C

3. Contact persons:

Dr. Ping CUI	Tel：3600458, 13615694456	Email：cuipg@ustc.edu.cn
Ms. Wei PEI	Tel：3601936, 13003005088	Email：wei3dwn@chinaren.com
Prof. Xiaoping Wang	Tel：3607090，13965050292	Email：xpwang@ustc.edu.cn
Prof. Jinlong YANG	Tel：3606408, 13965053276	Email：jlyang@ustc.edu.cn

Map of USTC, HFNL and Hotel