



international association for hydrogen energy

Clean and Abundant Energy for Sustainability

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Electronic Newsletter

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IAHE Objectives

The **objective** of the IAHE is to advance the day when hydrogen energy will become the principal means by which the world will achieve its long-sought goal of abundant clean energy for mankind. Toward this end, the IAHE stimulates the exchange of information in the hydrogen energy field through its publications and sponsorship of international workshops, short courses, symposia, and conferences. In addition, the IAHE endeavors to inform the general public of the important role of hydrogen energy in the planning of an inexhaustible and clean energy system.

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Any questions on the
E-Newsletter or IAHE?
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China Will Be Hosting WHTC 2013

The World Hydrogen Technologies Convention (WHTC) is a leading conference and exhibition in hydrogen, fuel cell and other related renewable energy technologies, under the auspices of the International Association of Hydrogen Energy (IAHE).



The WHTC takes place every two years on a different continent. Conferences were held in Singapore (2005), Italy (2007), India (2009) and Glasgow UK (2011), and will come to China in 2013 aiming to:

- Present high-profile presentations on up-to-date topics by selected international speakers from industry, academia and government.
- Demonstrate latest products and services in hydrogen, fuel cell and related fields.
- Encourage networking among anticipated 1,500 global participants.

The WHTC 2013 was organized by the China Association for Hydrogen Energy (CAHE), the only registered hydrogen energy academic committee in China with Mr. Shi, the former Secretary General of Ministry of



Science & Technology as the president and Prof. Mao from Tsinghua University as the chairman. CAHE has succeeded in organizing a number of top international hydrogen related conferences such as the 13th World Hydrogen Energy Conference (WHEC) in 2000, The International Hydrogen Energy Forum in 2004, and the 2008 International Hydrogen Energy Forum.

The following is an excerpt of the opening address given by Dr. Veziroğlu at the 19th WHEC meeting on June 4, 2012 in Toronto

Conversion to Hydrogen Economy

During this century the major problems facing the world are: (1) Global environmental problems, (2) Depletion of resources, (3) Famine and undernourishment in the third-world countries, and (4) World population growth.

The above problems involve energy, ecology and economics, and they are all interrelated. The global environmental problems are essentially the result of the combustion of fossil fuels, i.e., petroleum, coal, natural gas, and now unfortunately tar sands. These are the culprits causing global warming, climate change, ozone layer depletion, acid rains, pollution, oxygen depletion, oil spills and oil leaks. The hurricanes, typhoons, tornadoes, floods, droughts and heat waves are increasing in severity and frequency. The damage that results is hurting the world economy.

Also, the Earth's resources are being depleted rapidly. It is expected that the world's fluid fossil fuels production will peak in about ten years' time, and will then start to decrease. At the same time, the demand for oil continues to grow as developing countries, such as China and India, are becoming industrialized, and are having more and more cars and other vehicles. As a result, the price of oil keeps rising almost daily. Of course, as the price of energy rises, cost of transportation, cost of manufactured products, cost of agricultural goods, and cost of services rise as well.

It is the same with mineral resources. The production of the main minerals of our civilization, those of iron and aluminum, will peak in 35 and 25 years, respectively. Copper production will start to decline in 15 years' time. Timberlands are being reduced continuously. Every year, hundreds of species of flora and fauna are becoming extinct.

Food shortages and the population growth are very closely related. At the present time, the earth's population is growing at the rate of 1.1% per year. But this growth is not evenly distributed around the world and amongst the countries. Countries with high living standards have either zero growth, or close to it. On the other hand, the populations of the poorer countries are growing at a much higher rate – at about 2.5 per cent per year. The planet earth has a finite size. The agricultural lands and pastures it has, are limited in size. Consequently, food production cannot grow indefinitely, and has an upper limit. The people of the third-world countries are frequently undernourished, which can reach famine proportions. Because of the growing population, in addition to the food shortages, shortages of other supplies central to the well-being of the human race, such as water, are projected. Hence, the population growth itself is a major problem, which must be checked. One way of achieving this is by increasing the standard of living throughout the world.



Continued on page 3.

There are energy shortages, food shortages and environmental problems, because there are presently more people than this planet can comfortably support. A growing population needs more energy. Fortunately, the opposite is not true. More energy does not make a growing population; but by providing higher living standards, it checks the population growth and makes zero population growth possible.

There is a very elegant and permanent solution to these interrelated global problems facing the world: *It is the Hydrogen Energy System or Hydrogen Economy.*

Even though hydrogen is more expensive than fossil fuels, it has such unmatched, unsurpassed properties that it is making inroads in many directions. Hydrogen-fueled forklifts are being used in enclosed spaces. Various types of fuel cells are being used in power production. Major cities are experimenting with hydrogen-fueled buses. Fuel cells for electronic devices and mobile phones are close to commercialization. Germany is manufacturing and selling hydrogen-fueled submarines. Some companies are experimenting with hydrogen-fueled sea-going vessels. Hydrogen fuel cells are being considered for various aerospace applications. Hydrogen producers and some petroleum companies have agreed to establish hydrogen fueling stations throughout Japan and Germany. Major car companies have been planning to start selling hydrogen-fueled cars in Germany, Japan and wherever there are a sufficient number of hydrogen fueling stations, starting in two to three years' time.

Of course, if more countries or more regions have sufficient hydrogen fueling stations, market for hydrogen-fueled cars will be bigger. My advice to the petroleum companies is that they must use their huge profits to produce inexpensive hydrogen, and establish hydrogen fueling pumps or compressors next to gasoline pumps and diesel pumps in most of their fueling stations. They should help speed up the conversion to clean, pollution and global warming mitigating hydrogen, in order to remedy the sins of fossil fuels.

Instead, if petroleum companies keep using their huge profits and huge lobbying power, not constructively but destructively, and try to delay the conversion to Hydrogen Economy, then, we should do what the Editor of the New Scientist recommends: Governments, Ministries of Environment, Ecological Groups and People should sue the fossil fuel industry for trillions of dollars in damages. Damages which they are causing to the environment of the planet Earth and to the health of the people, just as people with cancer led the charge against big tobacco.

As I mentioned at the beginning, energy, environment, poverty and population growth are closely interconnected. Now, we have a chance to solve these world problems in one stroke, by providing humankind with abundant clean energy, while doing away with the poisoning of our biosphere at the same time. This is a very worthwhile and noble goal. You are all going to contribute to achieving this goal.

When I see the enthusiasm among the young and old, among the pioneers and disciples, I am heartened. I believe that the day of clean and abundant energy is close, maybe sooner than we think.

Ladies and gentlemen, I wish you Godspeed in your endeavors for a bright future.

Thank you,

T. Nejat Veziroğlu

President, International Association for Hydrogen Energy

News of Interest and Announcements

U.S.A. Secretary of Energy Changes Position on Hydrogen

The United States Secretary of Energy, Dr. Steven Chu, has had a well-documented history of skepticism about the potential for a hydrogen economy. In 2009, as the new Secretary of Energy, Dr. Chu stated in an Interview with Technology Review magazine that fuel cell powered light-duty vehicles were in need of a “**few miracles**” to make them viable in the market place. Dr. Chu’s Department of Energy went forward and backed this position with policy by reducing budgets for hydrogen related technologies across the entire profile of programs supported by the Department of Energy. The response of the fuel cell developers was to proceed forward, and government plans to deploy hydrogen infrastructure coordinated with automotive manufacturers planned 2015 roll-out in Europe and Asia steamed ahead despite the lack of support and world-wide financial downturn. Now it appears the Secretary has taken another look, and finds that hydrogen and fuel cells have potential. An online interview with Secretary Chu by Autoline Daily can be found at <http://www.youtube.com/watch?v=rJrJzZs66Y>.



US Energy Secretary Steven Chu

Essentially, Secretary Chu says that several things have changed his mind:

- 1) New-found abundance of United States natural gas (a source of up to 95% of the hydrogen produced today) and improvements in reformation technology has reduced the cost of hydrogen production to competitive levels.
- 2) Battery technology is simply not able to compete with hydrogen fuel cells in terms of range or refueling time in automotive systems. Hydrogen fuel cells can achieve the same range as conventional gasoline vehicles, and a refillable on the same order of time as conventional vehicles.

The IAHE applauds Secretary Chu’s reversal of opinion, and second look at the facts. We hope that this will be backed up with a reversal of the downward trend in funding for the DOE hydrogen and fuel cell technologies programs.

Call For New Student Chapters

The IAHE is continuing its call for the development of student chapters all over the world. To begin a chapter at your school, a faculty leader and interested students are needed. In total, over 26 student chapters in 9 countries are officially recognized by the IAHE. The activities for the chapter members can include participation in the hydrogen design competition, research seminars for graduate students, job fairs, social activities, and various other related activities chosen by the students. To become a student member (registration is free), please register online at:

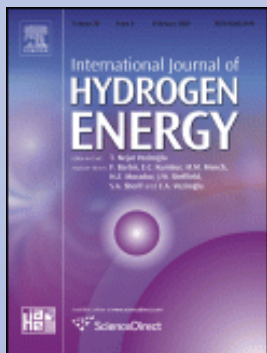
<http://www.iahe.org/Studentmembership.asp>

IAHE Affiliates:

The IAHE has organizational affiliate organizations worldwide. To see a complete listing, please go to: www.iahe.org

The IAHE also seeks to further develop and promote hydrogen-based organizations worldwide. For more information on collaboration opportunities, please contact Matthew Mench at mmench@utk.edu

International Journal of Hydrogen Energy Highlights



The *International Journal of Hydrogen Energy* provides scientists and engineers throughout the world with a central vehicle for the exchange and dissemination of basic ideas in the field of hydrogen energy. The emphasis is placed on original research, both analytical and experimental, which is of permanent interest to engineers and scientists, covering all aspects of hydrogen energy, including production, storage, transmission, utilization, as well as the economical, environmental and international aspects. When outstanding new advances are made, or when new areas have been developed to a definitive stage, special review articles will be considered. As a service to readers, an international bibliography of recent publications in hydrogen energy is published quarterly.

Impact Factor Update for the IJHE

The 2012 Impact Factor (Thomson Reuters) of the IJHE continues its rise, registering at 4.054. The 5 year impact factor, a measure of the longer-term impact of the articles published is even higher, at 4.402. The entire IJHE staff thanks the authors for their excellent contributions, and the reviewers for their tremendous help to continue the tradition of high-quality articles in the IJHE.

Most Highly Cited IJHE Articles (Last 5 Years)

1. **Metal hydride materials for solid hydrogen storage: A review.** Vol. 32, No. 9, pp. 1121-1140, Sakintuna, B., Lamari-Darkrim, F., Hirscher, M. (2007).
2. **A review on reforming bio-ethanol for hydrogen production.** Vol. 32, No. 15, pp. 3238-3247, Ni, M., Leung, D.Y.C., Leung, M.K.H. (2007).
3. **Continuous dark fermentative hydrogen production by mesophilic microflora: Principles and progress.** Vol. 32, No. 2, pp. 172-184, Hawkes, F.R., Hussy, I., Kyazze, G., Dinsdale, R., Hawkes, D.L. (2007).
4. **Biohydrogen as a renewable energy resource-Prospects and potentials.** Vol. 33, No. 1, pp. 258-263, Meher Kotay, S., Das, D. (2008).
5. **Towards the hydrogen economy?** Vol. 32, No. 12, pp. 1625-1637, Marbán, G., Valdés-Solís, T. (2007).
6. **Progress of electrochemical capacitor electrode materials: A review.** Vol. 34, No. 11, pp. 4889-4899, Zhang, Y., Feng, H., Wu, X., Wang, L., Zhang, A., Xia, T., Dong, H., Li, X., Zhang, L. (2009).
7. **A review of numerical modeling of solid oxide fuel cells.** Vol. 32, No. 7, pp. 761-786, Kakaç, S., Pramuanjaroenkij, A., Zhou, X.Y. (2007).

Top IAHE Downloads (June 2012-August 2012)

1. **Effect of pressure, composition and temperature characteristics on thermal response and overall reaction rates in a metal hydride tank.** March 2011 Agung Tri Wijayanta | Koichi Nakaso | Takuro Aoki | Yusuke Kitazato | Jun Fukai
2. **Metal hydride materials for solid hydrogen storage: A review.** June 2007 Billur Sakintuna | Farida Lamari-Darkrim | Michael Hirscher
3. **Simulation on thermoelectric device with hydrogen catalytic combustion.** January 2012 Feng Wang | Jing Zhou | Guoqiang Wang | Xinjing Zhou
4. **Review of the proton exchange membranes for fuel cell applications.** September 2010 S.J. Peighambardoust | S. Rowshanzamir | M. Amjadi
5. **Progress of electrochemical capacitor electrode materials: A review.** June 2009 Yong Zhang | Hui Feng | Xingbing Wu | Lizhen Wang | Aiqin Zhang | Tongchi Xia | Huichao Dong | Xiaofeng Li | Linsen Zhang
6. **Photo-electrochemical hydrogen generation from water using solar energy. Materials-related aspects.** October 2002 T Bak | J Nowotny | M Rekas | C.C Sorrell
7. **Hydrogen production by methane decomposition: A review.** February 2010 Hazzim F. Abbas | W.M.A. Wan Daud

The Young Scientists Division



The "Young Scientists Division" of the IAHE seeks to help develop and promote young researchers' involvement and training in educational and professional activities. To stimulate the exchange of information in the Hydrogen Energy field, the Young Scientists Division organizes international conferences, workshops, short courses and researcher exchange programs. The Division also works to promote activities to inform the general public of the important role of Hydrogen Energy in the planning of an inexhaustible and clean energy system. Membership is encouraged and open to both junior and senior members (both under and over 35 years old) in order to encourage cooperation between the experienced and new researchers to the hydrogen related fields.

We announce that the **Young Division Group** is already on LinkedIn and we invite you to join us. Create your free profile on LinkedIn at: <http://www.linkedin.com/>. Join the **Hydrogen Young Scientist Division** group following this link:

<http://www.linkedin.com/groups?gid=3716087&mostPopular=&trk=tyah>

For information on the Young Scientists Division and the Student Chapters, please visit:

http://www.iahe.org/young_scientist.asp

The WHEC2012 hosted the **Mini Symposium of Young Scientists**, dedicated to young researchers. Two sessions took place on June 3rd and June 7th, 2012, where scientists under 35 years old had the opportunity to present their PhD work, research activities, and projects.



Annalisa D'Orazio,
Chair
Young Scientists Division
CIRPS-Sapienza,
University of Rome

Know of a hydrogen-related meeting you would like to advertise?

Send a short description and web links to:

mmench@utk.edu

Please reference "IAHE Newsletter"

Mini Symposium of Young Scientists: WHEC2012



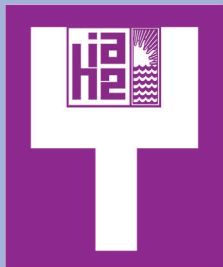
Prof. Veziroglu, President of IAHE, opened the session and welcomed to the audience, then **Dr. D'Orazio**, YD Chair, introduced the Young Division, and **Prof. Bladergroen**, YD Vice-Chair, gave a Lectio Magistralis on the role of hydrogen for young scientists.

People from all around the world participated in the Mini Symposium, which had:

- ➔ 50 participants per session
- ➔ 11 paper presentations
- ➔ 4 poster presentations

The Young Division of the IAHE was also honored to host the awards ceremony for the National Hydrogen Association Hydrogen Student Contest Design 2011-2012, where the team from the University of Maryland won the prize for the challenge: "Design a Tri-Generation System for your University Campus".

The Young Scientist Division



Mini Symposium of Young Scientists: WHEC 2012

Mini-Symposium Awards

Thanks to the IAHE, four young researchers were awarded prizes at the Mini Symposium. All participant abstract submissions were evaluated by two reviewers of the Scientific Committee taking into account the following aspects: originality, scientific progress, technological innovation, progress toward the feasibility of hydrogen-based energy systems, and impact on environmental sustainability.

The winners:

- ➔ **Dr. Ankur Jain** received an **award** for the work: “Destabilization of LiH by Li insertion into Ge”
- ➔ **Dr. Julien Lang** received a **travel grant** for the work: “The Effect of Cold Rolling on Magnesium Hydride”
- ➔ **Dr. Fabio Borgognoni** received a **travel grant** for the work: “Combined methane and ethanol reforming for pure hydrogen production through Pd based membranes”
- ➔ **Dr. Biniam Taddele Maru** received a **travel grant** for the work: “Biohydrogen production from glycerol using *Thermotoga spp*”



Second Young Division Meeting

The second Young Division Meeting was held on the first day of the Symposium. The participants discussed the future, reorganization and financing of the Young Division. It was suggested to create specific projects for finding funds from a sponsor, as a fellowship, registration fees to a conference, awards, etc.

All the participants agreed to maintain free registration for new members to the Young Division.

Future Meeting: WHEC2014 Mini Symposium

The next WHEC will be held in Korea in 2014, chaired by Prof. Dr. Byeong Soo Oh. The Young Division is in touch with organizers of WHEC2014 and is planning a possible Young Scientists Session. The Young Scientists Division also contacted Elsevier to plan a Special Issue of *IJHE*, devoted to the works presented during the Young Scientists Session at WHEC2014.

Annalisa D'Orazio,
Chair
Young Scientists Division
CIRPS-Sapienza,
University of Rome

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Send a short description and web links to:

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Upcoming Meetings, Activities, and Workshops

October 2012

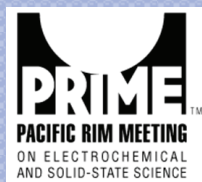
PRIME 2012: 222nd Meeting of ECS — The Electrochemical Society

2012 Fall Meeting of The Electrochemical Society of Japan

October 7-12, 2012

Honolulu, Hawaii, USA

<http://www.electrochem.org/meetings/biannual/222/222.htm>



f-cell: The fuel cell: 12th forum for producers and users & conference for battery and energy storage technologies

October 8-10, 2012

Messe, Stuttgart, Germany

<http://www.f-cell.de/englisch/conference/>



RETECH 2012: 4th Annual Renewable Energy Technology Conference & Exhibition

October 16 - 19, 2012

Omni Shoreham, Washington D.C., USA

<http://www.retech2012.com>



MH2012: International Symposium on Metal Hydrogen Systems

October 21 - 26, 2012

Kyoto City, Japan

<http://www.mh2012.jp/>



November 2012

2012 Fuel Cell Seminar and Exposition

Nov. 5-8, 2012

Uncasville, Connecticut, USA

<http://www.fuelcellseminar.com/>



February 2013

FC EXPO 2013: 9th International Hydrogen and Fuel Cell Expo

February 27 - March 1, 2013

Tokyo, Japan

<http://www.fcexpo.jp/en/>



March 2013

The 30th International Battery Seminar & Exhibit

March 11-14, 2013

Fort Lauderdale, Florida, USA

<https://powersources.net/florida/frameset.html>

April 2013

H2FC-FAIR 2013: Europe's largest hydrogen and fuel cells exhibition

April 8 - 12, 2013

Hanover, Germany

<http://www.h2fc-fair.com/>



May 2013

223rd Meeting of ECS — The Electrochemical Society

May 12 - 17, 2013

Toronto, Ontario, Canada

<http://www.electrochem.org/meetings/biannual/223/223.htm>

September 2013

ICHS 2013: 5th International conference on hydrogen safety

September 9 - 11, 2013

Brussels, Belgium

<http://www.ichs2013.com/>



WHTC 2013: The 5th World Hydrogen Technologies Convention

September 25 - 28, 2013

Shanghai, China

<http://www.whtc2013.com/>



November 2013

EVS27: The 27th International Battery, Hybrid and Fuel Cell Electric Vehicle Symposium & Exhibition

November 17 - 20, 2013

Barcelona, Spain

http://www.evaap.org/evs/evs_27.kin



Get Connected - Internet Groups of Interest

LinkedIn e-Connections

Fuel Cell & Hydrogen Network

Bringing together professionals and enthusiasts alike, the Fuel Cell & Hydrogen Network serves to connect those advocating fuel cell and hydrogen technologies. The group welcomes people who are interested in all types of fuel cell technologies as well as the wide variety of hydrogen technologies, and is not exclusive of hydrogen fuel cells.



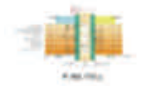
Fuel Cells

Welcomes those who are interested in clean energy fuel cell applications and technologies. Encourages members to start discussions that are relevant to fuel cells, to post promotions and jobs, and to use this group to develop their professional network.



Fuel Cell Technology

All those engaged in teaching, research, manufacturing and application of fuel cells are welcome to join the group.



Fuel Cells: Investment, Funding and Commercialization

The group is to discuss the path of fuel cell technology towards commercialization. While technology will be discussed, there is a special focus on private investment, government funding and updates in international policy as relating to fuel cells.



Fuel Cell Energy

The Fuel Cell Energy Group advocates the use of Fuel Cell Energy & the promotion of its Technology and for those interested in learning more about Fuel Cell Technology. Fuel Cell Professionals, Renewable Energy, Clean Technology, and Environmental Advocates are welcome. Solar, Wind, Biomass, Biofuel, Tidal Power & Wave Professionals also welcome to learn about this emerging technology.



HTPEM fuel cells

For Engineers, business people, scientists, journalists, authorities, investors etc. who are interested in HTPEM. Reports, discussions, analyses and networking events within the HTPEM fuel cell part of the fuel cell industry will be posted and shared.

Hydrogen Fuel Cell (Micro-CHP)

This group is intended to educate and share knowledge associated with micro-CHP systems that generate distributed energy—heat and/or electricity. This group is intended to cover residential, commercial, and public applications.



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Horizon Fuel Cell Technologies



Horizon Fuel Cell Technologies was founded in Singapore in 2003 and currently owns 5 international subsidiaries, including a new subsidiary in the United States. Having started commercialization with small and simple products while preparing for larger and more complex applications, Horizon already emerged as the world's largest volume producer of commercial micro-fuel cell products, serving customers in over 65 countries. In 2009, the team also began Horizon Energy Systems, a separate company in Singapore which applies its ultra-light fuel cell technologies for customers in Aerospace & Defense

Horizon's complete technology platform is comprised of three main parts: fuel cells and their materials, hydrogen supply and hydrogen storage. This platform enables a variety of product developments targeting commercial markets, both as Horizon products, as well as third party branded products.

Today, Horizon is able to produce extremely compact, lightweight, PEM fuel cells at varying degrees of complexity and performance, as well as deliver hydrogen storage and on-site hydrogen generation solutions that are suitable for many specialty and mainstream applications, including consumer electronics, portable power, educational solutions, stationary power, ultra-light systems for military use, as well as electric mobility solutions.

Fuel Cell and Hydrogen Energy Association

The trade association for the fuel cell and hydrogen energy industry. Dedicated to the commercialization of fuel cells and hydrogen energy technologies. Fuel cells and hydrogen energy technologies deliver clean, reliable power to leading-edge corporate, academic and public sector users, and FCHEA members are helping to transform our energy, economic, and environmental future.



Fuel Cell Nation



Fact-Based Analysis and Discussion of Clean Energy

<http://blog.fuelcellnation.com/>

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The Official Journal of the IAHE

<http://www.elsevier.com/locate/he>

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