UN Academic Impact Global Hub for Capacity-Building in Higher Education Systems at Handong Global University

2011

www.handong.edu
UNAI Global Hub for Capacity-Building (UNAI-GHCB) at Handong Global University encompasses the following three categories:

1. Global Education & Entrepreneurship (GEE)
   - Global Leadership Education (工) .................................................. 1
   - Global Entrepreneurship Education and Training (GET) .................. 4

2. Research for Green Growth (RGG)
   - Sustainable Food: From Corn to "Super Corn" ............................. 7
   - Plasma purification of Dirty Water .............................................. 10
   - Plasma Enhanced Clean Coal Energy ......................................... 13
   - Stable Atomic Fusion Energy (SAFE) Hybrid Power Generation .... 19

3. Global Partnership for Prosperity (GPP)
   - UNESCO UNITWIN Network ..................................................... 28
   - UNAI ASPIRE Network ............................................................ 32
   - World Friends Korea (WFK) Network ........................................ 34
   - Open Course Ware Network .................................................... 36
Global Education & Entrepreneurship (GEE)

- Global Leadership Education (工)
- Global Entrepreneurship Education and Training (GET)
Global Education for Sustainable Development

Globalization

Disciplinary Education

Inter & Trans

Honesty & Integrity

(GEE)
Education: UN Decade of Education for Sustainable Development

(UN/UNESCO DESD: 2005-2014)

The DESD breaks down the traditional educational scheme and promotes:

- Interdisciplinary and holistic learning rather than subject-based learning
- Values-based learning
- Critical thinking rather than memorizing
- Multi-method approaches: word, art, drama, debate, etc.
- Participatory decision-making
- Locally relevant information, rather than national
Education: International Implementation Scheme (IIS) of UN/UNESCO DESD (2005-2014)

- Partnership and networks
- Capacity-building and training
- Research and innovation
- Information and communication technologies
- Monitoring and evaluation
- Consultation and ownership
- Advocacy and vision-building
Cross-Disciplinary Global Entrepreneurship Education

Business

Technology

Law

Global Entrepreneurship

Honesty & Integrity
Promote -

Entrepreneurship Education and Training as the “Fishing rod” in place of the fish:

New Paradigm for world development
GET (Global Entrepreneurship Training) Implementation

- **Global Entrepreneurship Training (GET)**
  - GEST 2008 at HGU in Korea: 30 students from 22 countries
  - GET 2009 in Kenya: 100 students from Kenya and other African countries
  - GEST 2009 in **Mongolia** at Institute of Finance and Economics (IFE): 50 students from Mongolia
  - February 2010 in Cambodia: 80 students from Cambodia
  - July 2010 in Kenya 80 students from 7 countries
  - February 2011 in Korea 80 students from 36 countries
  - July 2011 in Kenya 95 students from 10 countries
Research for Green Growth (RGG)

- Sustainable Food: From Corn to "Super Corn"
- Plasma purification of Dirty Water
- Plasma Enhanced Clean Coal Energy
- Renewable Energy
- Stable Atomic Fusion Energy (SAFE) Hybrid Power Generation
Sustainable Food

From Corn to “Super Corn”

Sustainable Food

From Corn to “Super Corn” for Food Relief

Super corn
The International Corn Foundation is leading the movement to resolve starvation through scientific agricultural research.

The International Corn Foundation is an international relief organization founded in 1998 under the vision to resolve starvation and spread the vision of hope and peace. In the desperate search for solutions to the food crisis, our organization is dedicated to the scientific agricultural research aimed to develop the “Super Corn”.

POSCO Chair Professor Soon-Kwon Kim

www.icf.or.kr
Sustainable Water

Sustainable Water

Plasma Purification of Dirty Water

UN Academic Impact: Global Challenges  “Why Not Change the World?”
What is Plasma?

- 4th state of matter – neutral gas disassembled into ions and electrons. Total sum of ions and electrons is same, i.e., neutral electrically

- More than 99.9 % of the universe is composed of plasma. Its temperature, density, flow etc. can be controlled by electromagnetism

Principle of plasma generation
Application of high voltage (> 1kV) to ceramic electrodes with pin holes <1μm

Concentration of energy at electrodes cause creation of micro-bubbles serving as insulators that provide condition for discharge

High voltage flow through bubble cavity causing discharge, highly oxidizing radicals created by resulting plasma

Shockwave effect results as a result of collapse of cavity

From dirty water to clean water with plasma purification
Clean Energy Source: Coal Gasification

1. World leaders agree to develop clean coal energy
   - Core tasks for climate change - Coal gasification, carbon capture and storage

2. Clean usage of low grade coal is the main task
   - Most of nations have the low grade coal mainly, not high grade one
   - The price of low grade coal is $10~15, but high grade one is above $130
   - Require the cost down by advanced technology

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Possible Years of Exploitation</th>
<th>Deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>39 years</td>
<td>146.4 billion barrels</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>61 years</td>
<td>15.02 trillion m³</td>
</tr>
<tr>
<td>Coal</td>
<td>227 years</td>
<td>984 billion tons</td>
</tr>
</tbody>
</table>
Plasma Enhanced Gasification

1. Current
- 10-30 atmospheres, temperature > 1,000°C, high pressure required
- Preheating essential for operation, difficulties in operation/maintenance

2. Method of Improvement
- Atmospheric pressure – cost reduction of gasifier and supplemental equipment
- No need for preheating – reduction of operational costs
Plasma Induced Photosynthetic Micro-Organism Using Seaweeds ("Algae")

- Light generator, the lamp using plasma, reacts strongly certain light with particular wavelength necessary for photosynthesis.
- Photosynthetic "Algae-based" fuels can be a renewable energy, which can be ‘Biomass’ energy source as well as pollution control reducing CO₂ gas in the atmosphere.

Supply electricity for The plasma generation

- Plasma generating chamber,
- A pump to operate in vacuum, a power to generate plasma, and gas are needed
- Screen with hole structure about 10:1 aspect ratio to protect electromagnetic wave and UV
- Transparent insulator (glass, quartz etc.)

CO₂, moisture, nutrition etc.

Light

- Photosynthetic microorganism (bacteria, Algae etc.)

Products from “Algae”
- Biogas, ethanol, biodiesel, etc. by the biomass gasification
- Pharmaceutics
- Cosmetics
The conventional bulk silicon solar cells absorb energy only for the visible spectrum of sunlight. However, “quantum dots” have the advantage of being capable of being tuned to absorb different parts of the solar spectrum, which can increase efficiency of solar cells.

- Potential for silicon cell efficiency >30%
- Clean, environment friendly
- Abundant material
Ultimate Energy

Ultimate Energy

Stable Atomic Fusion Energy (SAFE) Hybrid Power Generation
The Ultimate Energy Ensuring Environmental Sustainability Can Be Achieved by Atomic Nuclear Fusion

- Carbon–free and clean energy
- Endless energy for all of the world
- Safe energy without resulting atomic weapon
- Peaceful energy without war for energy sources
- High efficient energy with high density and capacity
Atomic Nuclear Energy: Fission and Fusion

Fusion energy occurs while light atoms are fused as heavy one. Fusion energy is the holy grail for the world.

Fusion: Future Vision of Green Energy

Principle of Fission Energy

Atom of Uranium 235

neutron

Principle of Fusion Energy

Deuterium (D)

Neutron (n, 14.1 MeV)

Tritium (T)

Helium (He, 3.5 MeV)

\( E = mc^2 \)
The long-term future of nuclear may lie with a still-little-known third option: combining nuclear fission (atoms splitting) and fusion (atoms merging) in a single “hybrid” reactor.

This “Third Nuclear Way” deserves much wider understanding and support from governments, scientists, engineers and environmentalists alike.

- Commercial viability
- Waste minimization
- Proliferation mitigation

Safety
- Long-term sustainability

Short-lived isotopes
- Smaller repositories

Self-protecting waste
- Non weapons attractive

※The Best Option is Fusion + Fission Hybrid!!

The planet faces a tremendous challenge this century to close the gap between projected energy demand and the supply of sustainable, carbon-free, affordable energy. Today, 80 percent of the world’s total primary energy demand is met with fossil fuels, which emit significant quantities of carbon dioxide (CO₂), a greenhouse gas, into the atmosphere. This situation has implications both for our geopolitical energy security as well as for the global climate and ecosystem.
“DOE looks again at inertial fusion as a potential clean energy source.”

“Sometime during the next two years, physicists are expecting to achieve a long-sought milestone in fusion research: ignition and high energy gain. That breakthrough won’t be happening at ITER, the international collaboration that is building a reactor in France, but at the National Ignition Facility (NIF) for nuclear weapons-related experiments that was completed two years ago at Lawrence Livermore National Laboratory (LLNL).”
A Conceptional Design of Stable Atomic Fusion Energy (SAFE) Hybrid Power Plant

Laser Driver
To heat and compress the target to fusion ignition

Target Factory
To produce low-cost targets rapidly

Fusion Reaction Chamber

Hybrid Chamber
To recover the fusion/fission energy from the target/fissile fuel

Fission Blanket
To produce energy from sub-critical fissile fuel, i.e., Depleted Uranium, Thorium etc.

Heat Exchange & Turbine
To convert heat into electricity
Global Networking of GILT (Global Institute of Laser Technology) at HGU

Laser Fusion Energy through GILT

USA
University of Wisconsin

Korea
KAIST

Korea
GIST

Korea
NFRI

Korea
KAERI

Japan
Osaka University ILE (I. of Laser Engineering)

China
Shanghai Institute of Optics and fine materials (SIOM)

Czech Republic
Prague Asterix Laser System (PALS)

USA
Rocky Mountain Instruments (RMI)

Germany
Facility for Antiproton and Ion Research (FAIR)

Spain
Universidad Polytechnic de Madrid
Instituto Fusion Nuclear
centro De Tecnología Laserst
'하이브리드' 新 원자력 발전, 한국이 선점하자

김 영 길
한동대 총장

한국이 선점하자

지난 3월 11일, 규모 9.0의 강진으로 일어난 일본 후쿠시마 원자력발전소 사고로 원전(原電)의 안전성에 대해 전 세계의 경려가 쌓였다. 이에 기존 원전 방식을 개량한 하이브리드(Hybrid) 원자력 에너지가 주목받고 있다. 기존의 원전은 핵분열으로 에너지를 얻지만 하이브리드 원전은 핵분열에 핵융합을 결합한 형태다.

하이브리드 원전은 미국의 노벨 물리학상 수상자 Hans Bethe(ベーテ) 박사가 1979년 우리나라 대선 맹장력이 더 풍부하고 가격이 저렴한 토륨을 사용하는 방법으로 처음 제안하면서 시작했다. 하지만 당시에는 하이브리드 원전의 핵심인 순수 수소를 응합하는데 필요한 섬체가 약 100억도의 초고온을 달성할 방법이 없어서 이론만으로 머무르었다. 그러나 수소의 핵융합원소인 중형수소와 삼중수소를 사용하면 한 점 낮은 약 섬체 1억도 이상에서 핵융합이 가능하며, 최근 고온소자와 핵융합학의 발달로 하이브리드 원전의 실현 가능성이 커졌다.

하이브리드 원전은 기존 원전이 가진 단점을 극복할 수 있는 최선의 대안이다. 기존 원전의 고온 핵융합을 처리하는 데 매우 어렵고 에너지적인 제도이다. 하이브리드 원전은 핵융합을 다시 영향을 사용할 수 있어 고온원 핵융합을 걱정할 필요가 없다. 또한 하이브리드 원전은 비상사태 원전가동이 중단되며 핵융합 반응도 동시에 중단될 수 있도록 방식이 고안된다는 장점이 있다. 이번 후쿠시마 원전 사태에서 보듯 기존 원전은 가동이 중단되도 핵융합에 의한 열전도로 원자로 노심이 온도가 온도에 상당히 많이 풍난다는 장점이 있다.

이런 점에서 외국도 하이브리드 원전을 예의주시하고 있다. 지난 3월 24일자 뉴욕타임스는 하이브리드 원전이 인공가 발생할 수 있는 가장 위험한 것이고 안전한 방식이라고 보도했다. 4월 미국의 지명한 과학전문 매체 '피더스 투데이(Physics Today)'는 미국 에너지부가 첫째 항생제 원전으로 레이저 핵융합을 기반으로 하는 하이브리드 방식을 재검토하고 있다고 전했다.

한국의 원전은 최근에 보면 핵융합은 안전한 하이브리드 원자력 발전 개발을 시작하고 있다. 미국·일본·중국·유럽연합 국가들은 핵융합 반응은 확보하고 있지만 핵융합반응소를 상용화하기 위한 중요 기술인 고에너지·고반복도를 충족시키는 레이저 방진 및 레이저 매체의 음각기술은 확보하지 못하고 있다. 따라서 한국은 레이저 핵융합에 수수께끼가 가득 레이저 복합을 이용한 고반복도·고에너지 발생 기술을 실험실 규모에서 증명해 확보하고 있다. 우리가 하이브리드 원전을 주도할 정책적 작업은 완료된 것이다.

현재 지구촌은 에너지 분야에서 침체의 난관(逆接難)에 빠졌다. 기존 원전이 세계 경제를 이끌 수 있는 주요한 후보였지만 후쿠시마 사태로 세계 각국의 원전 건설에 신경 나서지 못하고 있다. 그렇다고 폭력·대양래 같은 신재생 에너지의 자연 상태와 더불어 우리 의존도가 어려운 기술에 에너지 분야의 주류가 될 수 없다. 이런 사태에 레이저 원전기술과 원전기술을 바탕으로 레이저 핵융합을 기반으로 하는 하이브리드 원전을 우리 나라가 개발한다면, 이제는 2030년까지 전체 전력의 약 60%를 원자력으로 생산하려는 한국만의 목표가 아니라 지구촌 전체의 에너지난을 해소할 단계가 될 것이다. 하이브리드 원전은 우리 민족이 세계 정세를 뒤집을 적호의 기회이다.
Global Partnership for Prosperity (GPP)

- UNESCO UNITWIN Network
- UNAI ASPIRE Network
- World Friends Korea (WFK) Network
- Open Course Ware Network
Establishing of the UNITWIN(University Twinning & Network) Network on Capacity Building of Sustainable Developing Countries

Ceremony at UNESCO Headquarters on 5 April 2007

Director-General of UNESCO, Koïchiro Matsuura and the President of Handong Global University, Dr. Young-Gil Kim, signed an agreement concerning the establishment of a UNITWIN cooperation program between UNESCO and the Network on Capacity Building of Sustainable Development in Developing countries.
We studied useful business plan in HANDONG for my country’s development
- Yana Ibragimova (Student from Uzbekistan)
Current Global Networking through the UNAI Global Hub at HGU

• Network: UNESCO UNITWIN (University Twinning & Networking)
  - 24 Universities at 14 countries to build capacities for sustainable development at developing countries
  - North-North-South-South Network of networks connecting developing and developed countries:
    - Three Dimensional Cooperation between North-South-South to Four Dimensional Cooperation to North-North-South-South Cooperation
List of UNITWIN Network Partnering Organization with HGU

- Institute of Finance and Economics, Mongolia
- Kandahar University, Afghanistan
- Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan
- Royal University of Law and Economics, Cambodia
- ACE Institute of Management, Nepal
- Hanoi National University of Education, Vietnam
- Hochiminh University of Social Science, Vietnam
- Kyrgyz Economical University, Kyrgyzstan
- Universidad Mariano Galvez, Guatemala
- St. Paul’s University, Kenya
- Talyor University, U.S.A
- Ho Chi Minh City University of Industry, Vietnam
- Chiang Mai University, Thailand
- Dalian University, China
- Royal University of Agriculture, Cambodia
- Pannasastra University of Cambodia
- University of Costa Rica
- Jalal-Abad State University, Kyrgyzstan
- National Polytechnic Institute of Cambodia
- Life University, Cambodia
- XacBank, Mongolia
- National Institute of Technology Panta, India
- Saint-Petersburg Christian University, Russia

[Total]
- University: 21
- Business Organization: 1
- Government: 1
“Action by Students to Promote Innovation and Reform through Education.”
Inauguration of Aspire Korea

**Aspire Korea**

Action by Students to Promote Innovation and Reform through Education
Partnership of UNAI with World Friends Korea (WFK)

Vision
- “A better world through sharing and learning”

Objectives
- To improve the quality of life of people in partner countries
- To strengthen the friendship and mutual understanding between Korea and partner countries
- To help volunteers fulfill their potential through volunteering
World Friends Korea (WFK)

- Consolidated brand of Korean overseas volunteer programs
- Brings together separately run volunteer programs
- Promotes Korea's overseas volunteers as a global brand
- Contributes to the international society
OCW?

OpenCourseWare (OCW) is a worldwide movement that started at MIT in 2001 when the university began opening course materials online free of charge. OCW contribute much to improving quality of education of its participant faculties and students as well as spreading knowledge to all who need a education. Currently, about 15,000 courses are available through 290 universities in 45 countries worldwide.

KOCWC (Korea OCW Consortium) tries to achieve ‘Global Partnership for Prosperity’ through the OCW and OER (Open Educational Resources) Worldwide Initiative which is hopes to make available educational contents from developing countries, as well as generating capacity building and greater collaboration and partnership among institutions.
Expected Outcomes of OCW/OER Worldwide Initiative

- **Capacity building:** Participating faculty will have a better understanding of teaching and learning.

- **Global benefits and prosperity:** Open contents will benefit teachers, students and self-leaners from all over the world.

- **Global partnership and collaboration:** the OER community will enable participants to access and exchange the knowledge with universities around the world.

**UNAI’s 10 UNIVERSALLY ACCEPTED PRINCIPLES**

**OCW/OER Worldwide Initiative will contribute to achieve UNAI’s Principles as well as the Goals of MDGs**
Global Partnership with Universities in developing countries

- Romania
- Mongolia
- Rwanda
- Kenya
- East Timor
- Other Developing Countries

As of today, OCW/OER Worldwide Initiative mainly cooperates with universities in 6 countries.
Global Networking of UN Academic Impact

UNESCO UNITWIN

UNDP

Developed Countries
- Korea
- USA
- Japan
- Germany
- France
- UK
- Netherlands
- Spain
- Norway
- G-20

Developing Countries
- Africa (sub-Saharan)
- Mongolia
- Nepal
- Uzbekistan
- Cambodia & Laos
- Pakistan
- Afghanistan
- G-77

International Development Education Alliance (GPP)
UN/UNESCO Global Education Park (GEP)

UN Academic Impact: Global HUB for Capacity Building

Concept Master Plan

GEE: Global Education & Entrepreneurship
RGG: Research for Green Growth
GPP: Global Partnership for Prosperity

UNAI Entrance

Global UN Village (GUU)
A. Sixteen Nations Hall (SNH)
B. Handong International School
C. Multi-Culture Exhibition Center (MCEC)
D. Culture Technology Research Center (CT)

UN Flag

UN Academic Impact Center (UNAIC)

UNESCO - UNITWIN Center (UUC)

Global Village

C1. Global Academy of Leadership (GAL)
C2. International Convention & Performing Art Center / GYM
C3. International Housing / Residential Halls

Amphitheater

Hidding Dream Field

Jogging Trail

Canal to Existing Lake

UN Academic Impact: Global Challenges “Why Not Change the World?”
"International collaboration is essential to solve global issues facing in the 21st Century. We would like to develop partnership and collaboration with other institutions of higher education, scholarship and research, private sectors, and NGOs in the fields of global issues of sustainable development and green growth through UNAI Hub at Handong Global University."

Please contact with:

President Young-Gil Kim, Ph. D
Handong Global University, Pohang, Korea 791-708
www.handong.edu

Tel.  +82 54 260 1001
Fax.  +82 54 260 1019
Email. ygkim@handong.edu / ygilkim7@yahoo.com
Thank You

Plant hope in the minds of people in need.
Curriculum Vitae of Dr. Young-Gil Kim
President of Handong Global University

Dr. Young-Gil Kim (ygkim@handong.edu) is the founding and chartered president of Handong Global University (www.handong.edu) in Pohang, Korea since 1995. Since then, he nurtured HGU to what it is today with his new educational philosophy based on cross-border, multidisciplinary and whole-person education with global perspective commensurate with the 21st Century. Prior to becoming the president of HGU, Dr. Kim was a professor of material science and engineering at the Korea Advanced Institute of Science and Technology (KAIST) for 15 years. While Dr. Kim was in the United States, he worked at NASA-Lewis Research Centre in Cleveland, Ohio, on high-temperature alloys for aerospace applications.

Dr. Young-Gil Kim was appointed as the Chairman of the Committee on Science & Technology, Presidential Advisory Council on Education, Science & Technology (PACEST) of the Republic of Korea since Oct 29, 2008. Also he has been inaugurated as a president of Korean Council of University Education(KCUE) and serves as the Chairman of Education Sector of the Korean National Commission for the UNESCO, and UNESCO Chair/UNITWIN Network of International Centre for Capacity Building and Entrepreneurship at HGU.

Dr. Kim received B.S. in Metallurgical Engineering from Seoul National University, Seoul, Korea, in 1964; M.S. in Metallurgical Engineering from University of Missouri-Rolla in 1969; and Ph.D. in Material Science & Engineering from Rensselaer Polytechnic Institute, Troy, New York, in 1972. Dr. Kim received Ph.D. in International Management Honoris Causa from the Institute of Finance and Economics (IFE) of Mongolia in 2003. Dr. Kim also received Honorary Doctorate Degree in Management Science from KOREA Advanced Institute of Science and Technology (KAIST) in 2011.