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# Opportunities for International Collaboration

R.P.H. Chang

Northwestern University

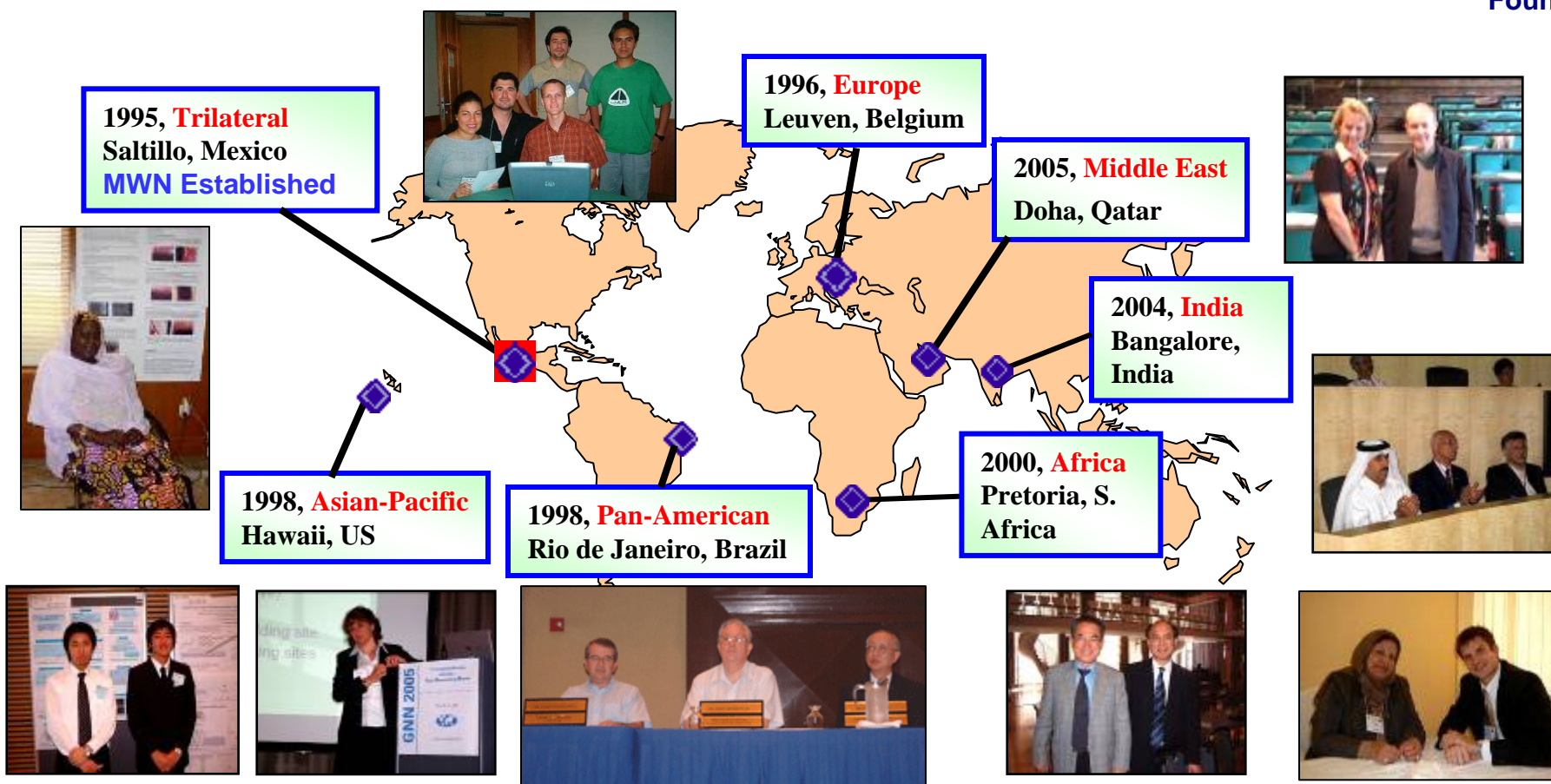


Materials World Network

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**Materials World Network** is a diverse group of stakeholders promoting global cooperation in materials science, engineering, and education



“Over the past decade, the Materials World Network has reached out to nearly every region of the globe. *To my knowledge, there is no comparable effort to encourage a genuinely integrated world community in any other field of science and engineering.* Dr. A. Bement, Jr. at MWN: The Next Ten Years, Cancun, Mexico, August, 2005

# Example: MWN Workshop in Qatar



## International Conference on Materials Research and Education: Future Trends and Opportunities

**Doha, Qatar**  
**April 4-6, 2005**



**Mission:** (1) Build regional capacity in materials research and education  
(2) Stimulate regional collaborations (3) Foster international cooperation

**Working Format:**  
Information Sharing and  
Strategic Planning



**Countries Represented:**

Bahrain, Egypt, Iran, Jordan,  
Lebanon, Oman, Qatar, Saudi  
Arabia, Turkey, UAE and US



**Materials World Network**



# Program Framework\* for MWN



**Joint funding programs** now exist between NSF and many of its counterparts:

## NSF- Europe/ NSF-EC Collaboration in Materials

Austria, Belgium, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovak Republic, Spain, Sweden, Switzerland, and UK

## CIAM - Colaboración Interamericana en Materiales

Argentina, Brazil, Canada, Chile, Colombia, Jamaica, Mexico, and Trinidad and Tobago

## NSF-Asia Cooperation in Materials

China, India, Israel, Japan, Saudi Arabia, Singapore, Taiwan, and Turkey

## NSF-Africa Cooperation in Materials

Algeria, Egypt, Ethiopia, Ghana, Morocco, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tunisia, Uganda, and Zimbabwe

Visit <http://www.nsf.gov> for more participating countries





**G**lobal **N**anotechnology **N**etwork

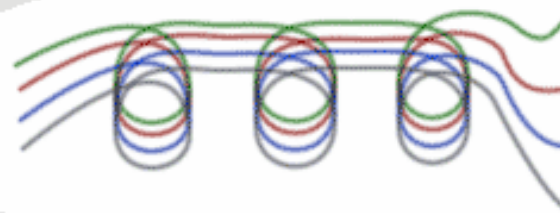


**National Science  
Foundation**

## Third GNN Development Workshop

May 26-27, 2005  
Saarbrücken, Germany

**GNN  
Project  
Strands**



**Education**

**Research**

**Facilities**

**Database**



**Organized by:**



**Sponsored by:**



**Participants from 25 countries + EC** (Australia, Austria, Belgium, Brazil, Canada, China, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Romania, South Africa, Spain, Sweden, Switzerland, Taiwan, U.K., U.S.)



**G**lobal **N**anotechnology **N**etwork

## GNN Member Networks

### EUROPE



**nanoforum.org**  
European Nanotechnology Gateway

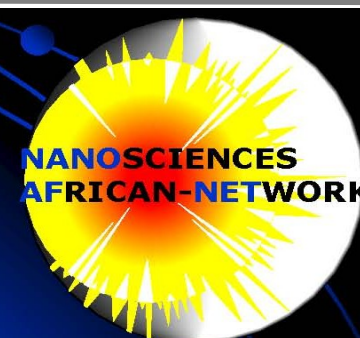
### AMERICAS



### ASIA

**ANF**  
ASIA NANO FORUM

### AFRICA





# Global School for Advanced Studies

Training Global Leaders in Science and Engineering

## Mission

1. **Develop Global Leadership Capabilities** in young scientists and engineers
2. **Foster new research synergies** in critical global challenge areas

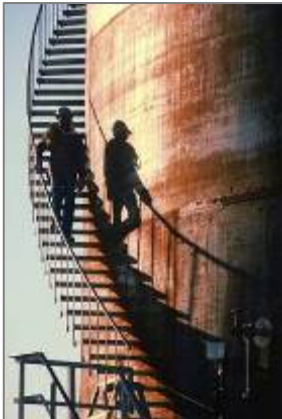
## Systems Approach to R&D

Integrates research with design, manufacturing, policy, and technology management.

## Global Participation

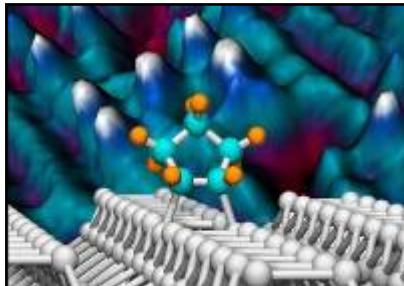
**GSAS Scholars:** Advanced graduate students, postdocs and junior faculty

**GSAS Fellows:** Senior researchers, industry planners, & policy makers



## GSAS Research Focus

Global Challenge Areas: Energy, Environment, Health...



**Dual Curriculum:** Face-to-face Sessions + Team Research Fellowships



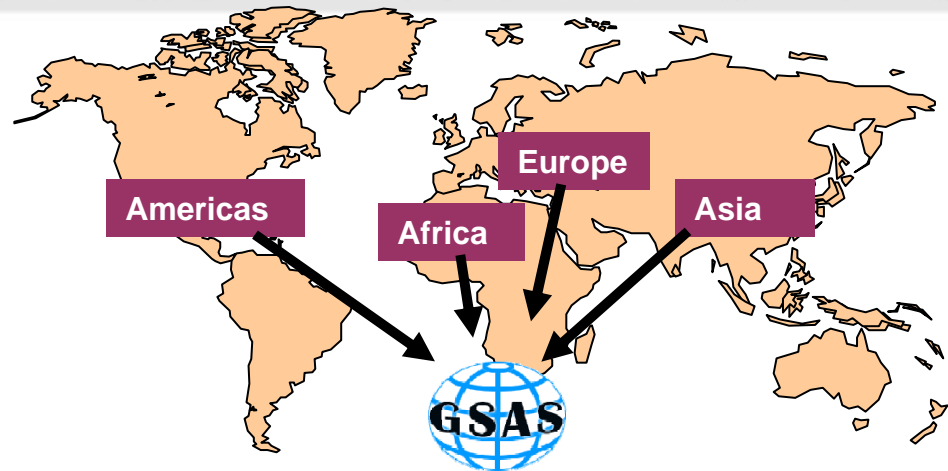


# Global School for Advanced Studies

Training Global Leaders in Science and Engineering

## GSAS Scholars:

advanced graduate students, postdocs form Global Research Teams



## GSAS Fellows:

experts from academia, government & industry serve as Project Mentors



## GSAS Organization

### Executive Committee

(members from Asia, Europe, Africa, and the Americas)

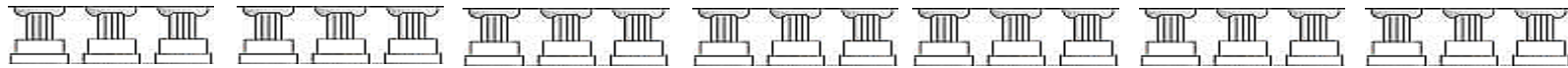
### Participating Institutions

(universities, research institutes, industry, etc.)

### Advisory Board

(60 + global experts in research, policy, technology development)

## Support from all regions of the world



Africa	Americas	Europe	Asia / Pacific





# Global School for Advanced Studies

Training Global Leaders in Science and Engineering

## GSAS Session on Advanced Solar Cell Research



### 10-day Session + Project Implementation

### Global Challenge: Renewable Energy

#### Pre- Session:

Teams formed,  
background  
reading; Project  
Planning begins

Advanced  
Lectures (R&D,  
manufacturing,  
tech transfer,  
policy, etc.

Team Project  
Planning & Expert  
Mentoring

Team  
Presentations &  
Project Review

#### Post-Session:

Best project is  
implemented via Team  
Research Fellowship  
at ITRI, Taiwan!





**Global School for Advanced Studies**

Training Global Leaders in Science and Engineering

**The Winning Research Project – “A More Efficient Architecture for the Sensitization of TiO<sub>2</sub> for dye-sensitized Solar Cells” - was selected for implementation at the Industrial Technology Research Institute (ITRI) Taiwan**



**WINNING RESEARCH TEAM with members from Japan, South Africa, US, Philippines, and Taiwan.**



**ITRI has state-of-the-art research facilities in nanoscale materials and solar cell research.**



# National Center for Learning and Teaching in Nanoscale Science (NCLT)



## Global Networking Events (Partial List)

**April 2005** – Invited speaker at EC Nano Education Workshop Brussels, Belgium

**May 2006** – Co-organized Nano Education Workshop Nice, France

**July, 2006** – Co-organized Nano Education Workshop Beijing, China

**August 2006** – Co-organized Science Education Roundtable in Cancun Mexico

**September 2006** – Invited speaker at the Asia Nanoforum Workshop on Nanoeducation in Taipei, Taiwan

**August 2007** - Materials Education Summit, Shanghai, China

**\*\*\*\*\*November 13-14 2008** – Will organize Global NSEE Workshop, Washington, DC



NCLT

NU . UM . PU . UIC . UIUC . ANL . AAMU . FU . HU . MC . UTEP . PSS

