

Global Materials Network for Young Researchers (GMN)

R.P.H. Chang
Northwestern University
IUMRS



Outline

- “Future Earth” and Sustainability
- The role of MSE
- GMN rationale
- Mission and goal of the GMN
- Coordinators and infrastructure



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2



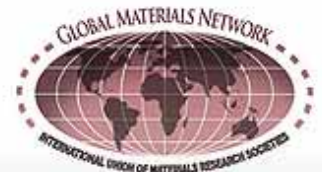
Looming Problems

- The 21st century citizens of the world facing unprecedented challenges
 - Exponential population growth
 - Rapid economic expansion of developing countries
 - Uncontrolled burning of hydrocarbon energy resources → run-away global warming
- Natural cycles in equilibrium being perturbed, leading to disappearance of biological and plant species essential to livelihood



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3



Other global challenges

Top 10 global issues facing the 21st century

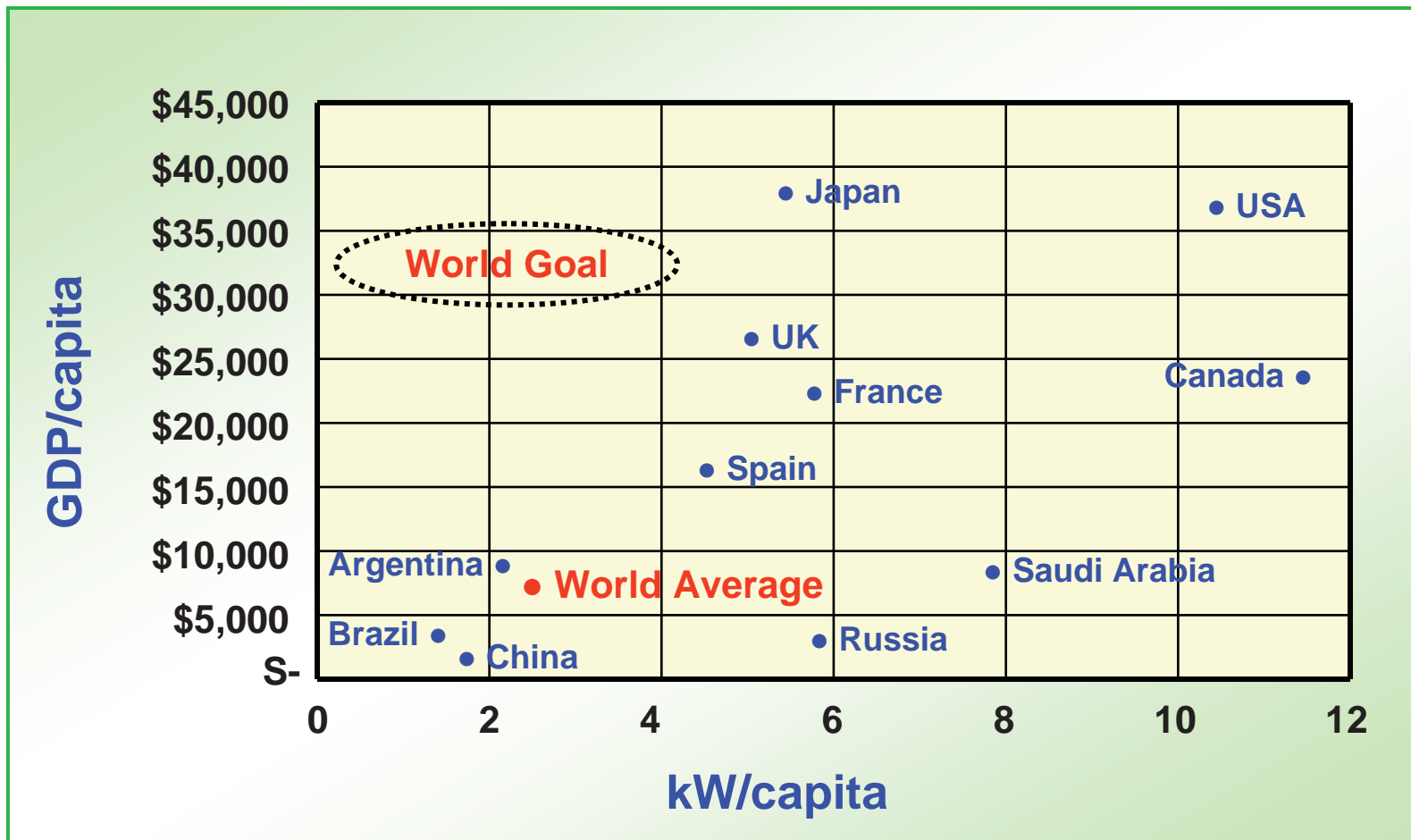


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4



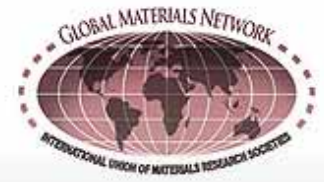
Per Capita Income & Energy Use Around the World



Source: Key World Energy Statistics from the international Energy Agency, 2006. Author: Frank van Miorlo

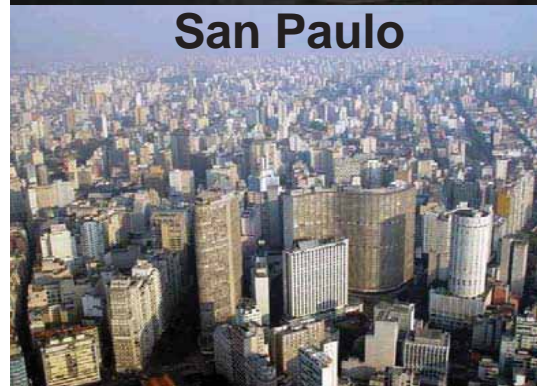
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5



Challenges common to big cities

- Rapid increase of high population & building densities
- Transportation issues
- High energy density utilization
- Quality of life issues
 - Environment
 - Communication
 - Safety



City-based solutions

- Adopt and develop clean / renewable energy resources
 - Solar
 - Wind
 - Geothermal
 - Clean Coal, etc.



City-based solutions

- Develop ways to conserve energy usage while maintaining a high quality of life:
 - Buildings
 - Transport
 - Manufacturing



Spertus
Institute of
Jewish
Studies,
Chicago,
Krueck &
Sexton

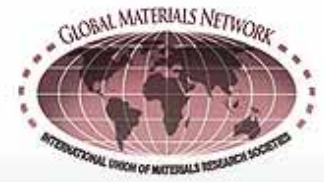


Pearl River
Tower,
Guangzhou,
China, SOM



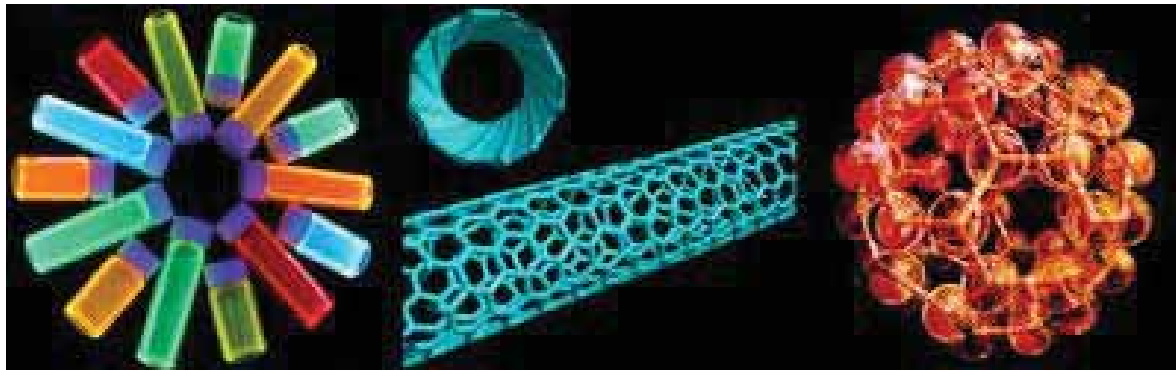
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8



The importance of MSE

- Materials science and engineering (MSE) has been the generator of advanced technologies over the centuries. It has:
 - Helped economic development
 - Improved the quality of life



The importance of MSE

- MSE is anticipated to play a key role in providing solutions to global problems in **energy, environment, health, and security**

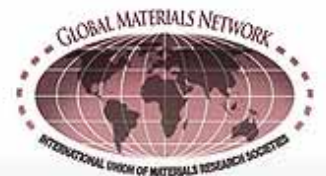


Rationale: Finding a solution *together*

- While the technology for a solution may be there, implementation will require the participation of all countries and citizens
- No one country or region can solve the highly coupled problem alone



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GMN: Mission and Goal

The Global Materials Network (GMN) will unite young materials researchers around the world and promote their global collaborations in materials research and education through a *network platform with nodes existing across the globe.*



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12



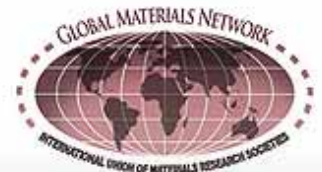
Implementation

While opportunities for face-to-face, **real space** interactions will be available through meetings and workshops, the GMN website will serve as a **virtual space** to enable continuous connections and ongoing dialogues for materials scientists and engineers to stimulate communication and collaboration



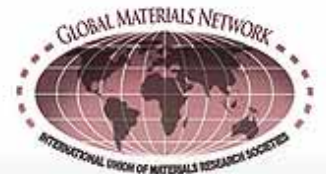
Council of Regional Coordinators

- R. Geetha Balakrishna (India)
- Vassilios D. Binas (Greece)
- Mingzhi Dai 戴明志 (China)
- Jiaxing Huang (US)
- Muhammad Huda (US)
- Oussama Moutanabbir (Canada)
- Sangeetha Palanivelu (India)
- Jessica Schiffman (US)
- Aloysius Soon (S. Korea)
- Markus Valtiner (Germany)
- Aron Walsh (UK)
- Evan Laurence Williams (Singapore)



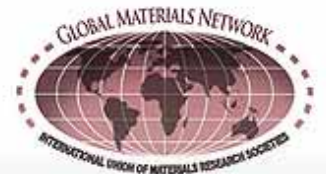
Examples of exciting activities

- **Every 2 years, there will be an ICYRAM meeting where researchers will get together to share research and educational findings and develop collaborations**
- **A Young Researcher Award and recognitions will be given at ICYRAM meetings**
- **The GMN website will be for interactive dialogue and collaborations. The website is user-driven and managed.**



GMN Expansion plan

- The Global Materials Network will evolve to be a dynamic website serving *millions of users* from academic, industry, government, and non-profit sectors
- The website and ICYRAM meetings will become a *central destination* for innovators and visionaries to create solutions for global problems together



Initial launch



Conference Registration

IUMRS-ICYRAM 2012 in Singapore served as the inaugural launch of the Global Materials Network



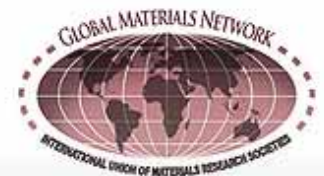
Dinner Buffet



ICYRAM Lecture: "Mentorship for Young Scientists: Developing Scientific Survival Skills" – Federico Rosei, Universite du Quebec, Canada



ICYRAM Leader Addressing Focus Group



Upcoming event: ICYRAM 2014

- The 2nd International Conference for Young Researchers on Advanced Materials will be held at the Hainan International Convention & Exhibition Center in Haikou, China, October 24-27, 2014.
- About 800-1,000 attendees expected
- Technical discussions, collaboration planning, and culture tour



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18



ICYRAM 2014

- <http://www.icyram2014.org/>
- Organized by C-MRS and IUMRS
- Technical program will emphasize 8 themes:
 - Energy and Environment Materials
 - Electronic Materials
 - Nanomaterials and Devices
 - Advanced Ceramic Materials
 - Advanced Metallic Materials
 - Biomaterials
 - Materials Characterization and Evaluation
 - Materials Modeling and Simulation
- Ample discussions and preparations for collaborations will take place



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19



Regional nodes will support workshops, schools, and new initiatives

Initiatives such as...

- *Workshops* to share knowledge
- *Discussions* to open dialogue
- *And collaborations* to empower one another and join efforts

...will be held at

- Global
- Regional
- And community scales



...to benefit ***all citizens***, from middle and high school children to professors and professionals!

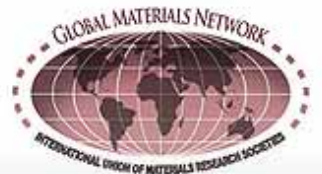


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Preparing future science and engineering literate citizens

- **Technology alone will not solve the world problems. All citizens around the globe need to participate to make a change by:**
 - Changing living habits and attitudes towards global cooperation
 - Adopting new technologies This requires education!
- This requires ***education***



STEM Education in early years

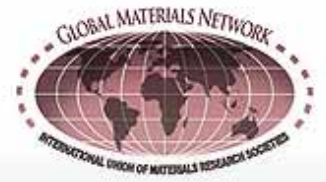
- Start from middle school!
- www.materialsworldmodules.org



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22



STEM Education in college

- **Nanotechnology Center for Learning and Teaching (NCLT):**
 - Publishes integrated STEM instructional modules with nano-based applications;
 - Offers professional training;
 - Develops a network of multi-sector nano education communities
 - **Go to: www.community.nsee.us**



STEM Education post-college

- **Global School for Advanced Study (GSAS)**
 - Fosters innovation and equips young researchers to address the most pressing research questions of our time
 - Dual mission: 1. Address global challenges such as energy, environment, health, and security, and 2. Build global leadership
 - **Go to: www.gsasprogram.org**



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24



How to be a member of the GMN ?

- We will soon have on-line membership application and registration
- Criteria for membership: active global-minded young researchers who are eager to actively participant in a growing Global Materials Network.
- Please contact:
R-Chang@Northwestern.edu



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25

