Update

Global Relationships Take Center Stage at the 2012 Annual Meeting

In support of its strategic mission to become a global organization of chemical engineering practitioners (see sidebar), AIChE hosted three joint international symposia at the 2012 AIChE Annual Meeting held in Pittsburgh, PA, Oct. 28 to Nov. 2. AIChE joined with the Korean Institute of Chemical Engineers (KIChE), the Indian Institute of Chemical Engineers (IIChE), and the U.K.-based Institution of Chemical Engineers (IChemE) to discuss collaboration between the organizations, to present and exchange technical developments, and to identify ways to boost membership, among other goals.

AIChE's International Committee developed the three symposia, each with a different impetus and slightly different objectives. Every year, the committee chooses one country to focus on at the Annual Meeting, and for 2012 the committee selected India. This is the first time that AIChE has hosted IIChE at one of its meetings.

"We highlight one region at the Annual Meeting, and we invite the chemical engineering leaders of that country or region to discuss with us how we can interact more efficiently," says Liang-Shih Fan, a chemical engineering professor at Ohio State Univ.

▲ Speakers at the AIChE-IChemE joint symposium gather for a group photo. From left: Jeff Siirola, Raffaella Ocone, Hank Kohlbrand, Dale Keairns, Andrew Furlong, and Richard Darton.

The KIChE symposium, on the other hand, was initiated by Ah-Hyung (Alissa) Park, a professor of chemical engineering at Columbia Univ. and a member of the KIChE-U.S. chapter, who suggested a session titled "KIChE and AIChE Friendship Symposium." The third symposium was organized based on discussions between past presidents of AIChE and IChemE.

India and the U.S.

The committee had several intentions for the U.S.-India joint symposium: establish AIChE student chapters in India; showcase technical work taking place in India and the U.S.; and promote interaction between the Accreditation Board for Engineering and Technology (ABET) and the Indian accreditation council.

"The aim of this workshop was to reach out to leading chemical engineers in India and invigorate the ties between AIChE and IIChE," says Sankaran Sundaresan, a professor of chemical and biological engineering at Princeton Univ., who co-chaired the U.S.-India symposium. "Everyone left with a sincere belief that closer interaction between AIChE and IIChE is beneficial for chemical engineers in both countries," he says. "On the whole, we felt that we moved forward in spite of challenges."

Sustainability was the focus of many of the technical talks. "This theme is timely for every part of the world, and leading researchers in every country are addressing these challenges," Sundaresan says. "Given the current interest in this topic, it was chosen as a framework to build the relationship between the two societies," he explains. "The participants from India got to hear about work in these areas from leading academic and industrial researchers in the U.S., and the Indian participants told us about similar work in India as well as the remarkable educational initiatives in progress in India," he says.

The symposium opened with Aniruddha Pandit, a professor of chemical engineering at the Institute of Chemical Technology in Mumbai, discussing the evolution of chemical engineering in India. (Ganapati Yadav, also from the Institute of Chemical Technology, prepared the talk, but was unable to present it in person in Pittsburgh because his flight was cancelled due to Hurricane Sandy.) Pandit explained that the country's burgeoning population, diverse culture, and varied income groups pose significant challenges to realizing sustainability in the production of chemicals and energy. This discussion provided a foundation for the remaining presentations, which explored various ways chemical engineers can address the challenges facing India in the coming years.

George Stephanopoulos, a professor of chemical engineering at the Massachusetts Institute of Technology (MIT), shared his thoughts on collaborative process engineering as a means to achieve sustainability in the chemical industry. In order to advance India's large-scale chemical manufacturing processes, India must invest more in research and development, Stephanopoulos said. And, he added, the R&D should focus on developing models and simulation software that can be used to design chemical processes that are sustainable.

Designing sustainable manufacturing processes is particularly important

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for India's specialty chemicals industry, which represents a fast-growing market in India, said Vivek Ranade, a scientist at the National Chemical Laboratory in Pune, India. The market for specialty chemicals could grow from Rs150,000 crores ($27 million) in 2010 to Rs750,000 crores ($137 million) by 2022, Ranade said. This projected growth will require a shift in the way chemicals are produced — from stirred batch processes, to modular, agile, intensified, and continuous (MAGIC) processes.

Other talks included: "Solid Electrolyte Technologies for Energy and Environment," presented by Ashok Joshi, president of Ceramatec, a ceramics material technologies company based in Salt Lake City, UT; "A Life Cycle Model of Water Use in India with Implications to Manufacturing," presented by Bhavik Bakshi, a professor of chemical and biomolecular engineering at Ohio State Univ.; and "Sustainable Energy Research in Chemical Engineering," presented by Rakesh Agrawal, a professor of chemical engineering at Purdue Univ.

KIChE's 50th anniversary

The Korean Institute of Chemical Engineers joined AIChE in Pittsburgh to celebrate its 50th anniversary. Founded in 1962, KIChE now has over 5,000 members, nine regional sections, and 13 technical divisions.

The two societies came together so that academic and industrial participants could share ideas and learn about research directions and activities from world-renowned scholars, says Jae Lee, a professor of chemical engineering at the City College of New York, who chaired the joint symposium.

Presentations spanned a broad range of topics, including tissue engineering, thin-film solar cells, zeolite catalysts, and academia's role in transitioning research developments out of the lab. The KIChE-AIChE sessions concluded with a talk by Hyung-Shik Shin, a professor of chemical engineering at Chonbuk National Univ., Jeonju, South Korea, on the history and future direction of KIChE.

Looking forward, Korea will host the 9th World Congress of Chemical Engineering, which will be held in Seoul later this year (Aug. 18–23). The theme of the conference is "Chemical Engineering: Key to the Future."

Energy and sustainability

The joint AIChE-IChemE symposium arose from discussions among two past AIChE presidents, Hank Kohlbrand (2010) and Dale Keairns (2008), and two past IChemE presidents, Richard Darton (2008/2009) and Desmond King (2010/2011). They have been working together to identify ways that the two societies can collaborate to better serve chemical engineers and the chemical engineering profession. The symposium was co-chaired by Keairns and Raffaella Ocone, a chemical engineering professor at Heriot-Watt Univ., Scotland.

"The initial area for cooperation focuses on global challenges where chemical engineers can make a significant contribution, and through addressing those challenges promoting the global profession of chemical engineering," Keairns says. "Energy and sustainability represents one of those challenges and was the topic for the recent symposium," he says. "One of the themes was to bring together different perspectives on how this challenge is being addressed."

The presentations provided a range of perspectives on both the challenge

AIChE Expands Internationally

Become a global organization of chemical engineering practitioners. This is one of the five strategic goals identified in AIChE's long-range strategy, which was approved by the Board of Directors in April 2008. The International Committee was formed to oversee the implementation of this goal.

In light of this, AIChE has shifted its three-pronged mission to put it into a global context: to serve professionals throughout the world; to serve the global profession; and to serve our global society.

This version of AIChE's Mission Statement offers a more diverse and meaningful view of chemical engineering. Many of the problems of society today are global in nature. For example, as the population grows, more people need access to energy, safe water, and a cleaner environment. Chemical engineers can help with these issues and improve our quality of life. In addition, AIChE's Center for Chemical Process Safety (CCPS) has become more global; international companies now make up almost 40% of the 155 CCPS member companies.

On a more granular level, AIChE's international effort provides members with individual benefits. These include:

- enabling networking and connections with chemical engineers worldwide
- providing information about and awareness of global opportunities
- adopting global best practices regardless of where they originate
- offering faster identification and communication of problems
- providing the ability to impact societal issues globally.

Over the past few years, AIChE has worked diligently toward expanding its global presence. The society has established an international-friendly dues structure, which includes lower dues in countries with lower income levels, and has entered into agreements with societies in India, Korea, and Argentina, among others, to offer their members joint membership in AIChE at a discounted rate. In addition, AIChE has interacted with many international organizations and has played a major role at several international conferences.

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(*i.e.*, climate change) and ways to deal with it, including views from Europe and the U.S., and from each of the two chemical engineering societies, as well as a perspective of the role of chemical engineering societies in general.

"The spirit of the symposium was to draw the boundaries out further, beyond the more frequent framework that results in viewing the problem as conflicting goals — for example, safety vs. security vs. health vs. sustainability, etc.," Keairns explains. "The session was framed with a view to think of the problem in a larger context, to make the problem more solvable, provide more options, more synergies," he elaborates.

A presentation by Andrew Furlong (representing Ed Daniels, who was unable to attend the meeting because of the hurricane) illustrated how different the energy and sustainability challenge can be, depending on which lens it is viewed through. The European Union, which is the world's largest energy market, includes 27 states spread across varying geographies, climates, political systems, etc. Thus, issues and public attitudes vary from one region to the next, and this, he points out, adds a level of complexity that the U.S., for instance, does not have to deal with.

Within these diverse perspectives, the scope of the energy and sustainability challenge is broad, and encompasses such topics as carbon management, water, policy, technology, and economics, each of which was discussed at the joint session.

For instance, Kohlbrand provided an industrial perspective on what he refers to as the water-energy nexus — water use (for drinking, sanitation, and agriculture) requires energy, and energy production requires water. While industry has focused on managing energy for some time, it has not put the same effort into the management of water, Kohlbrand said. As the population continues to grow and as the standard of living increases in developing regions, this imbalance will become more pronounced. Global water requirements will grow from 4,500 billion m^3/yr in 2012 to almost 7,000 billion m^3/yr in 2030; the available water supplies might satisfy only 60% of demand by 2030, Kohlbrand said. The significance of the water-energy nexus would then become obvious: A shortage of water could inhibit energy production and could result in more energy being used to pump water.

Jeff Siirola, a professor of chemical engineering at Purdue Univ. and a past AIChE president (2005), discussed carbon management, emphasizing the role of chemical engineering societies to aid in this endeavor. "Even with substantial lifestyle, conservation, and energy efficiency improvements, global energy demand is likely to more than triple within 50 years," Siirola said. In the absence of breakthrough sequestration technologies, the world's reliance on fossil fuels is not sustainable, he continued. He pointed out the fact that carbon management is expensive and has limited profit opportunities, and then posed the question: How can international chemical engineering societies collaborate to address greenhouse gas mitigation through carbon management technologies? Siirola offered several possible answers. One idea is to establish an AIChE Industry Technology Group (similar to other AIChE groups, such as the Center for Chemical Process Safety [CCPS]) that would bring together several professional societies (*e.g.*, IChemE) to collectively address the technological issues. Another proposed idea is to create an industry group to tackle the regulatory side of carbon management.

Among the other presentations was one that expanded the discussion outside of the traditional technical arena. In a presentation titled "Science/Technology/Risk Communication: It's Harder Than You Think (Had Hoped)," Paul Fischbeck, a professor of engineering and public policy, and of social and decision science, at Carnegie Mellon Univ., said, "Every day, science reveals new insights that change how we understand the world. These insights lead to new technologies that in turn lead to new engineered systems that transform how we can interact with each other and the environment. Critical to this evolution is how these new scientific insights and technologies are communicated to society at large and policy-makers in particular."

He pointed out that communicating the risks and benefits of a new technology requires more than an engineer. Social scientists need to become part of the development process to avoid the implications of miscommunicating with the public. This is especially true when it comes to climate change — the risks of climate change, as well as the risks associated with carbon-mitigating technologies.

When it comes to risk, the communication process is not as simple as telling the public the truth; the right balance between honesty and effectiveness must be reached, Fischbeck emphasizsed.

The symposium ended with a lively panel discussion, with dialogue reaching across societal boundaries and disciplines.

Looking abroad

AIChE has interacted with many international organizations in addition to KIChE, IIChE, and IChemE. These include: the German Society for Chemical Engineering and Biotechnology (DECHEMA), the Canadian Society for Chemical Engineering (CSChE), and the Chemical Industry and Engineering Society of China (CIESC). Presently, AIChE is developing relationships with organizations in the Middle East, in particular Saudi Arabia, where it has been invited to assist in creating the chemical engineering curriculum at local universities.

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