new technologies to create prototypes of novel integrated circuits that require less energy per function, consume less power, and increase performance.

Materials also play a key role in the biosystems and micromechanics IRG, which studies mechanics at the molecular, cellular, and tissue levels, *in vitro* and *in vivo*, to better understand the interactions between diseased tissue, biology, and mechanics. Materials are essential tools in the *in vitro* experiments, which involve a lot of behind-the-scenes manufacturing, characterizing, and processing of materials, said Krystyn Van Vliet, lead investigator for the IRG. For example, experiments might involve materials that mimic biological tissue or require a new kind of polymer to differentiate cells based on their migration properties. In addition, the group is developing new tools for characterizing the optical properties of tissue *in vivo*, which could also be applied to engineered materials.

The SMART Center also includes an innovation center focused on translating basic research into commercialized applications, preferably in Singapore, modeled after the Deshpande Center for Technological Innovation at MIT. The Innovation Center offers grants for prototyping and proof-of-concept experiments, mentoring by volunteers from the Singapore business community, and educational entrepreneurship programs.

The SMART Center grew out of an ongoing relationship between MIT and Singapore, which started with a letter of interest from then Dean of Engineering at MIT to then Deputy Prime Minister of Singapore in 1997. The Singapore-MIT Alliance (SMA) was formed in 1998 as an education and research collaboration involving MIT and the two research universities in Singapore, the National University of Singapore and the Nanyang Technological University, primarily in the areas of engineering and life sciences. The SMA is now winding down, but the creation of SMART provides an opportunity to greatly expand that research collaboration, according to the NRF.

Faculty and students in Singapore and MIT have benefited greatly from the collaboration, both academically and culturally. "I figured the SMA and my involvement in Singapore in general may enhance my own development as well as possibly moving my own research ideas forward," said Fitzgerald. "It turns out that I have met close collaborators and friends; understand Asia more than I did before, of course, in particular, Singapore; and have now been able to launch a big collaborative vision that I could not have done without SMA and SMART. I now realize that SMA and SMART are glimpses of what collaborative innovation will look like in the future."

For more information on the SMART Center and opportunities for involvement, visit http://smart.mit.edu.

**Kendra Redmond**

## USA, Europe collaborate on smart grid standards

www.nist.gov www.cen.eu www.cenelec.eu www.etsi.org

This fall, the U.S. Commerce Department's National Institute of Standards and Technology (NIST) and the European Union's (EU) Smart Grid Coordination Group (SG-CG) jointly announced their intention to work together on Smart Grid standards development, emphasizing common goals and areas of focus.

Both NIST and the SG-CG have mandates to coordinate the development of a standards framework for Smart Grids, which can unlock innovation in the electrical sector. The two organizations outlined areas for future collaboration in a joint white paper, which can be accessed from the NIST website. The SG-CG represents three private-sector standards organizations: the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC), and the European Telecommunications Standards Institute (ETSI).

Smart Grids are next-generation electrical grids that attempt to predict and intelligently respond to the behavior and actions of all electric power users connected to it in order to efficiently deliver reliable, economical, and sustainable electricity services. The new collaboration is meant to ensure that Smart Grid standards on both continents have as much in common as possible, so that devices and systems that interact with these grids can be designed in similar fashion.

Smart Grids are expected to ease the incorporation of renewable energy sources, energy-saving devices, and electric vehicles into the power system. Overall goals include the reduction of carbon emissions and security of supply.

"It is promising to see that NIST and SG-CG will be supporting a number of common positions and areas of collaboration to ensure a consistent set of international standards," said Ralph Sporer, chair of SG-CG.

According to NIST's George Arnold, the national coordinator for Smart Grid Interoperability in the United States, the many facets of Smart Grid development—spanning multiple sectors of the economy and a wide range of stakeholders—make the standardization effort anything but business as usual, but this collaboration will advance efforts in the long run.

To promote this transformation, governments on both sides of the Atlantic have taken a number of actions in recent years, including the U.S. Energy Independence and Security Act of 2007 and the American Recovery and Reinvestment Act of 2009, and Europe's Directives 2009/72/EC and 2009/73/EC within the framework of the 3rd Package for the Internal Energy Market. This legislative effort has translated into a number of standards initiatives like the NIST Framework and Roadmap for Smart Grid Interoperability Standards in the United States and a Smart Grid mandate in the EU. □