polymer precursors and to improve conversion and compositing technologies such as compression molding, high-pressure resin transfer molding, and insert/overmold injection molding.

At the other end of the life cycle, composites are currently recycled in limited quantities. "One challenge is to take the material back to a clean enough state so that it can be reused," said Kelly Visconti, a technical manager at the DOE Advanced Manufacturing Office. The polymer matrix and fiber have to be separated for the fiber to be reused, and this is currently done using heat, which can damage the fiber. "Composites are essentially long fibers with glue sticking them together," she said. "The trick is to remove enough polymer without damaging the fiber. We're looking for new ways to do that."

The IACMI will also have a heavy focus on modeling and simulation "to make sure we understand the properties that are really needed for an application," Blue said. Aerospace parts, for example, require composites with more than double the tensile strength and elastic modulus than auto parts need. So it might be possible to make car parts using lower temperature processes that result in less-enhanced materials properties. "The key thing in automobile is don't pay for properties that you don't need," he said.

Developing new lightweight composites for automobiles will require a multi-material solution, Blue said. So scientists will look at a combination of carbon-fiber and glass-fiber-reinforced composites, but also at metals such as manganese and aluminum.

In addition to materials research, the IACMI should help to advance technical education and to train a skilled manufacturing workforce for supporting the anticipated growth in advanced composites across the country. Over the next 10 years, more than 30,000 US manufacturing jobs could be created in the fiber-reinforced polymer industry, the IACMI estimates.

The IACMI is the fifth institute to be selected in President Barack Obama's National Network for Manufacturing Innovation (NNMI). The NNMI, first announced by the White House in January 2013, is intended to launch regional hubs that will boost advanced manufacturing, foster US innovation, and create jobs. The four institutes launched to date focus on additive manufacturing, wide-bandgap semiconductors, lightweight technology, and integrated digital design and manufacturing.

Prachi Patel

Spintronics research in Singapore gets a boost with new funding
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Many mobile phone users complain about having a short battery life, which requires them to recharge the battery on a daily basis. This is because a battery needs to "feed" billions of energy-hungry, tiny electronic components within the phone—even when the user is not operating the phone. In the not-so-distant future, mobile phone batteries may be able to last weeks or longer, due to latest research in spintronics.

Spintronics is an emerging area that holds great potential for creating the next generation of electronic devices. The National Research Foundation (NRF), Prime Minister's Office, Singapore, announced in April a new fund of S$5 million, to support industry collaborations with Institutes of Higher Learning in developing new applications through spintronics research.

"Spintronics research focuses on creating 'normally-off' devices for 'always-on' applications. Computers are like humans, having to constantly access memory when making decisions. When users demand higher performance, it creates more traffic between the command center and the memory unit. In addition to making the memory nonvolatile, spintronics research could help to significantly shorten the distance of this information highway, making it faster and more energy efficient. It could also lead to completely new logic devices that have brain-inspired computing applications," said Wu Yihong, a professor in the Department of Electrical and Computer Engineering, Faculty of Engineering at the National University of Singapore (NUS).

Wu heads the Singapore Spintronics Consortium (SG-SPIN), which was set up last year by NUS and Nanyang Technological University (NTU) and supported by the NRF, to spur collaborative research partnerships between industry and Institutes of Higher Learning in the area of spintronics.

SG-SPIN has already initiated collaborations with industry on a number of spintronics research projects. This includes research to increase the speed and capacity of data storage in computers, improve energy efficiency in electronic gadgets, and develop new ultralow powered devices.

"Building on the [S]$39 million for on-going research work by SG-SPIN members, the National Research Foundation has allocated a further [S]$5 million to support SG-SPIN joint industry research collaboration projects. These funds will help to bridge the gap from research to industry application and grow the spintronics ecosystem in Singapore," said Low Teck Seng, CEO of NRF Singapore.

"We appreciate NUS' effort in taking the lead to drive spintronics technology as it enables SG-SPIN consortium members to learn more from the marketplace and to study the feasibility of any potential new applications that will benefit the industry members' customers," said Rajesh Nair, Vice President, Technology Development, at GLOBALFOUNDRIES, which is a co-founder of SG-SPIN. "It is important for GLOBALFOUNDRIES to be at the forefront of technology innovation to research and develop competitive and viable solutions for our customers since we serve all the key growth markets including computing, mobility, automotive, and industrial segments." □