

## PowerFilm and Researchers Work Together to Advance Solar Cells

*It's no surprise that PowerFilm is collaborating with Iowa State University on research that could impact the efficiency of solar cells. The Ames company, established in 1988 as Iowa Thin Films, has strong ties to the university.*

PowerFilm is a world-leading developer and manufacturer of thin, flexible solar modules using a proprietary low-cost production process. Products include everything from portable and rollable solar chargers to solar panels that are integrated with building materials to offer an alternative power source direct from the structure.

Cofounder Frank Jeffrey first did research on solar energy with Ames Lab physicist and Iowa State professor Howard Shanks in the late 70s. When Jeffrey and a colleague launched the start-up company, they subcontracted with Iowa State for research to further develop and improve the solar cells they wanted to manufacture and sell.

Today, Kristen Constant and others on the Iowa State photonics research team are working on photonic band gap materials, which are structures that manipulate light. "We are trying to design and build structures that have interesting properties," says Constant, materials science and engineering (MSE) professor and chair. "Some of these structures are transparent and actually reject heat. That would make a highly efficient window. When we realized that was a potential, we started looking at who we could engage from an industry point of view to work with us."

While Constant's research is primarily funded by the Department of Energy (DOE) through Ames Lab, DOE funding does not address specific applications for companies. Consequently Constant sought CIRAS' assistance to help bridge the gap between the lab research and something that could eventually roll off the production line.

Recognizing the challenge of obtaining government funding and the potential benefits to a company like PowerFilm, CIRAS agreed to support MSE graduate student Ryan Gebhardt.



Dan Stieler, senior physicist at PowerFilm, is excited about the project. "Our goal is to make the solar cells produce more energy," he says. "Iowa State has the analytical equipment to help us determine the best way to do that. It's great to be able to bounce ideas off each other."

Constant is pleased with the progress thus far. "We were trying to take our structure and figure out how to scale it up, but when we realized what the constraints were in the manufacturing process, we built some slightly different structures that still performed okay," she says. "It's really become a nice hybrid, a melding of the two technologies."

PowerFilm has also worked with undergraduate industrial technology students in the Department of Agricultural and Biosystems Engineering (ABE). In 2010, ABE lecturer Jacquelyn Baughman was looking for projects that would help her students gain hands-on experience.

At the time, PowerFilm wanted assistance in the areas of Lean manufacturing and plant layout. "Bringing students in for projects gives them good experience tackling a problem and allows us to move the ball forward on things that are important but not necessarily our highest priority," says Pat Rundall, vice president of operations.

Each student team met with PowerFilm representatives to discuss potential projects. The teams then developed a charter that outlined the project's scope. "The ultimate goal," Baughman says, "is to have a positive impact on the company's bottom line and for the students to develop professionally in workplace competencies."

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