



THE Ames Laboratory  
*Creating Materials & Energy Solutions*

## Lightweight, Flexible Photovoltaic Power Systems

- ◆ Lightweight solar electric systems that can be rolled up for storage or transportation and unrolled for use. The systems are significantly more portable and rugged than traditional crystalline or polycrystalline photovoltaic units.
- ◆ Extensive military applications – used since 2004 by the U.S. Army for tents that double as battery chargers.
- ◆ Satellite and portable electronics applications.
- ◆ Current plans to incorporate solar modules into steel roofing and siding units for industrial buildings.
- ◆ Based on work done in a Basic Energy Sciences project at the Ames Laboratory.

In the 1970s, Frank Jeffrey was a graduate student at the Ames Laboratory working on a BES project on a novel semiconductor-amorphous silicon. While the BES work continued through the 1980s at the Lab, Jeffrey took his expertise to 3M, where he collaborated with the National Renewable Energy Laboratory to develop a method of fabricating thin-film amorphous silicon solar cells on polymer substrates, using continuous-roll processing.

In 1988, Jeffrey and his 3M colleague, Derrick Grimmer, moved back to Ames to form Iowa Thin Film Technologies, Inc. making flexible thin-film photovoltaic units. The Department of Energy provided early funding for the startup company through its Small Business Innovation Research Program, and NREL's Photovoltaic Manufacturing Technology Program subsequently helped the company reduce its production costs.

Starting from a BES project in the 1970s, PowerFilm, Inc. (formerly Iowa Thin Film Technologies, Inc.) has added 20,000 square feet to its facility in Boone, Iowa, just a few miles from the Ames Lab, to meet its growing manufacturing needs. The company is delivering the world's most lightweight and flexible solar



*Lightweight and flexible solar electric panels incorporated into the fabric of tents to charge batteries for the U.S. military.*

***PowerFilm, Inc. is delivering the world's most lightweight and flexible solar modules for use in civilian and military portable electronics and satellites...***

modules for use in civilian and military portable electronics and satellites, and plans to serve customers who would bond the modules onto steel roofing and siding units for buildings.

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