

## Flexible Solar Cells

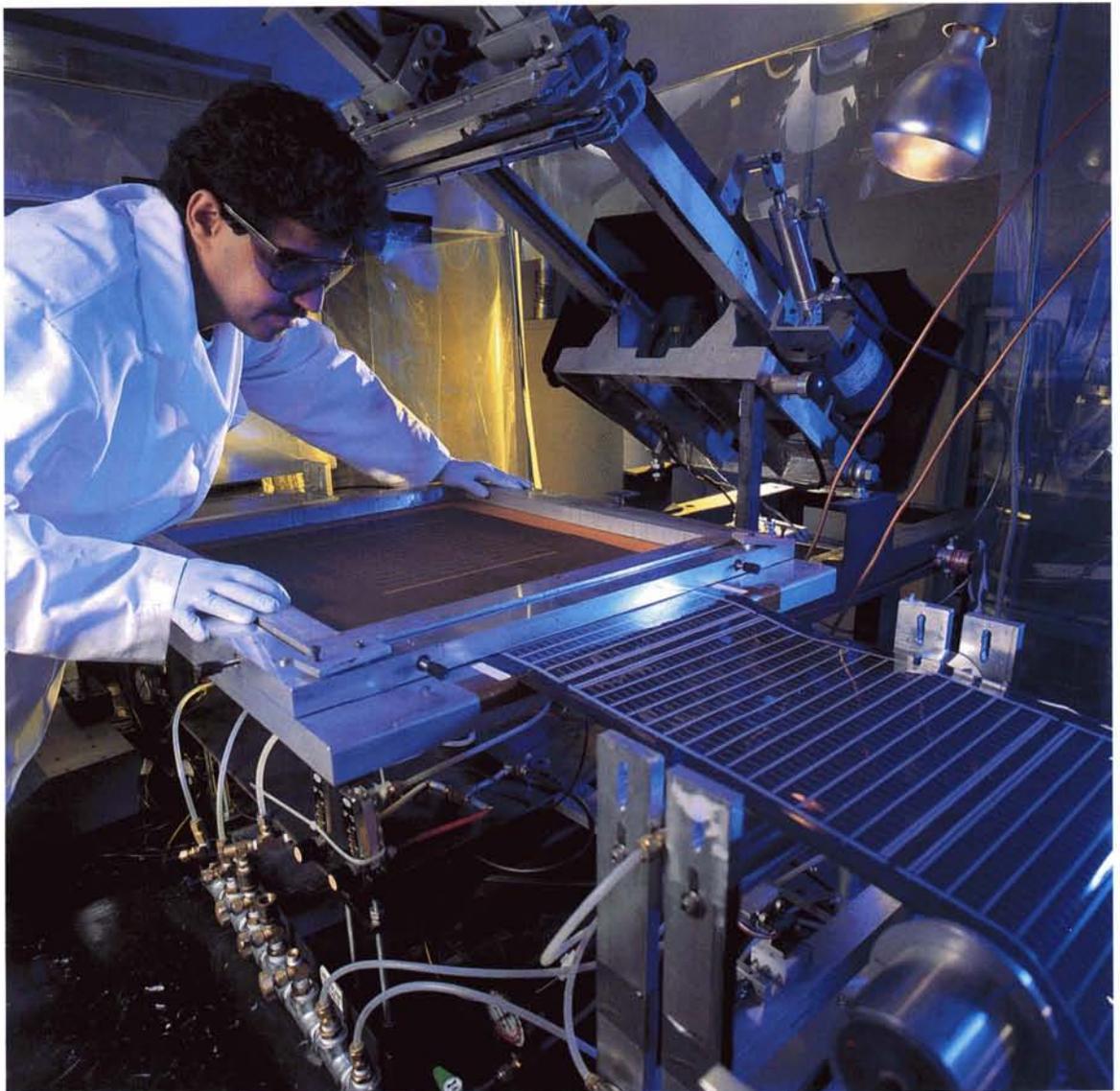
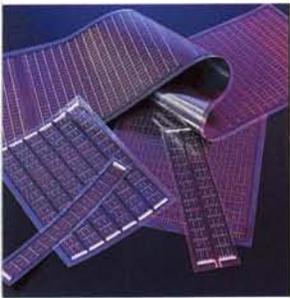
Consumer/Home/Recreation

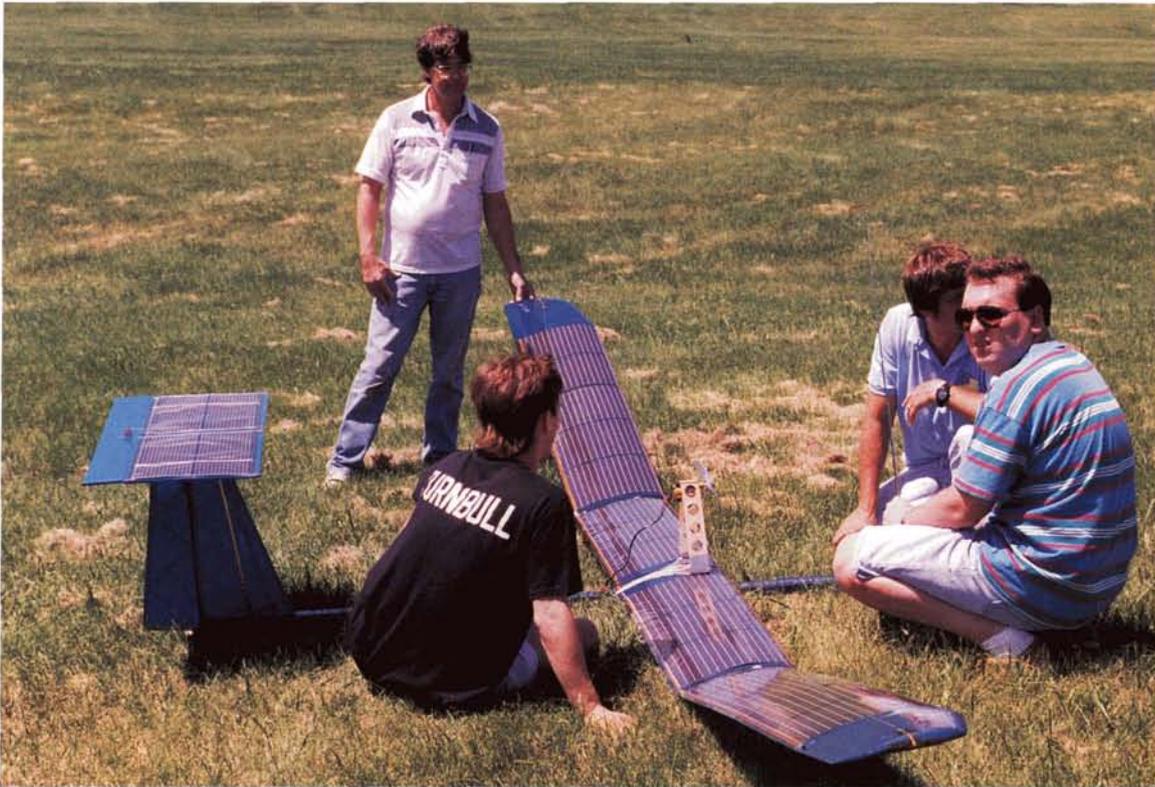
**A**t left below are a number of solar cell "modules" produced by Iowa Thin Film Technologies, Inc., Ames, Iowa. They represent an advancement over the traditional solar cell for certain applications in that they are extremely light, can be rolled or folded and made to conform to curved surfaces, and are made of non-breakable materials for durability. The products and the company are spinoffs from research grants by NASA and the Department of Energy (DoE).

A module is a plastic strip coated with a thin film of photovoltaic silicon that collects solar energy for instant conversion into electricity. Lasers divide the thin film

coating into smaller cells to build up voltage; Iowa Thin Film Technologies' modules can supply from .8 volts to 200 volts. The modules are fabricated by laser scribing and welding, and by screen printing on the plastic substrate as shown below.

**At right** is a solar-powered model airplane built by the company to demonstrate the product. The cell modules mounted on the wing sections collect light from the Sun and convert it to electricity that drives the small motor and propeller atop the wing center section. The company is selling modules to model airplane enthusiasts through hobby catalogs.





Iowa Thin Film Technologies' principal products, however, are for use in applications currently served by batteries: as electrical supply for indoor advertising displays and as battery rechargers for recreational vehicles. The point-of-sale advertising modules use the ambient light in a store to power flashing lights or a motor in the advertising display. For the recreational vehicle application, the modules are incorporated in the rollout awning cover on the top side of the vehicle (**below**); the light weight and flexibility of the cell modules make this application possible.

These applications represent only the beginning of a lengthy list of possibilities envisioned by company president Frank Jeffrey and co-founders Derrick Grimmer and Steve Martens. They see future use for the modules as power supplies for toys and educational kits; as battery

chargers for electronic equipment, radios and computers, as well as recreational vehicles and boats; as energy suppliers for industrial safety equipment; in mobile communications systems; and for camping and emergency gear.

The development of flexible cells began in 1988 as a joint project of 3M Company, St. Paul, Minnesota and Iowa State University (Ames), working under a grant from the Iowa Department of Economic Development. When the grant expired, 3M physicists Jeffrey and Grimmer decided to leave the company and pursue further flexible solar cell research on their own; they moved to Ames, founded Iowa Thin Film Technologies and teamed with the Iowa State research team on a new project to explore advanced solar cell technology for space flight and consumer products. Working under a new contract with Lewis Research Center and DoE under the Small Business Innovation Research program, they generated the flexible solar cell technology and developed techniques for manufacturing the modules.

Looking to the future, Jeffrey, Grimmer and Martens believe that the technology has excellent long range potential for remote power applications in parts of Africa, the Middle East, India and China. They acknowledge that a further reduction in manufacturing costs will be needed for such applications, but they are starting now to get an early handle on product definition and marketing networks.

