NREL Licenses Technology to Increase Solar Cell Efficiency

National Renewable Energy Laboratory

The U.S. Department of Energy's National Renewable Energy Laboratory (NREL) announced today that Natcore Technology Inc. has been granted a patent license agreement to develop a line of black silicon products.

Natcore and NREL also will enter a Cooperative Research and Development Agreement (CRADA) to develop commercial prototypes based on NREL's black silicon inventions and patents.

"This technology will play and important role in moving forward the availability of solar technologies," NREL Vice President for Commercialization & Technology Transfer William Farris said. "It is one more step to help bolster the Department of Energy's SunShot Initiative to make solar energy cost competitive with other forms of energy by the end of the decade."

The Black Silicon Nanocatalytic Wet-Chemical Etch [1] emerged from work by NREL photovoltaic researchers that demonstrated that black silicon solar cells, which have been chemically etched to appear black, better absorb the sun's energy. The inexpensive, one-step method reduces light reflection from silicon wafers to less than 2 percent, and promises to reduce manufacturing production cost and capital expense.

Any photons reflected from the surface of a solar cell are wasted. To reduce reflected sunlight and increase cell efficiency, NREL scientists invented the antireflection process that turns silicon wafers black so they absorb 98 percent of solar radiation. Today's solar cells absorb about 95 percent of the sun's radiation.

The much-lower-cost recipe is still a few tenths of a percent less efficient than the best of the conventional cells. However, the black silicon prevents reflection of low-angle morning and afternoon sunlight far better, which means a jump in photovoltaic efficiency of at least 1 percentage point can be achieved.

NREL estimates that its method can reduce processing costs by 4 to 8 percent, resulting in overall savings in solar cell manufacturing of 1 to 3 percent, making black silicon particularly appealing.

The Black Silicon Nanocatalytic Wet-Chemical Etch was honored with a 2010 R&D 100 Award. The R&D 100 award is considered in the research and development community to be "the Oscars of Innovation."

NREL is the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency research and development. NREL is operated for DOE

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