SOLAR ON THE CHEAP: THANKS PURPLE POKEBERRY![1]

Arnie Cooper©

"A valueless plant growing wild…" might be dictionary.com's definition of purple pokeberries, but David Carroll, director of Wake Forest University's Center for Nanotechnology and Molecular Materials, says the omnipresent "weed" will soon play a role in improving solar power in places ranging from residential green building in the United States to areas in the developing world cut off from the power grid. Carroll says a red dye made from pokeberries can be used to coat a new type of solar cell that's produced from millions of tiny plastic fibers. Unlike traditional solar units, fiber cells — thanks to a patented design that exposes more surface area to the sun's rays — can produce a usable amount of power even at sunrise and sunset. (Carroll has created a spin-off company, FiberCell Inc., which is producing the first prototype cells.)

"This adds to the power a solar panel can generate during the day, but it also brings a number of dyes into commercial viability that could not be considered previously, such as the pokeberry dye," he says. "Before our technology, this dye would have produced too low of a performance to warrant putting it in a solar cell structure, but using the fiber cell makes for an efficient system." The dye acts as an absorber helping the cell's tiny fibers trap significantly more sunlight during the day, compared to current solar systems, that then gets converted into energy. The technology is especially promising because it is able to generate twice the total kilowatt-hours per day than traditional silicon-based units. Additionally, because of its "unique angular capture profile," the material can be mounted at oblique angles on a structure yielding extremely high performance — great for architects seeking Leadership in Energy & Environmental Design, or LEED, certification. In any event, the result is a winning combo: the cost advantage of thin-film photovoltaics with the efficiency of silicon cells.

To create the cells, the plastic fibers are stamped onto plastic sheets, using the same process employed to attach the tops of soft-drink cans. Then the pokeberry-dyed absorber is sprayed on. And because the plastic makes the cells lightweight and flexible, a manufacturer could roll them up and ship them at low cost to developing countries, where locals could actually grow and harvest the pokeberries and apply the dye themselves. FiberCell also envisions employing its technology for large-area manufacturing installations and military applications.

Carroll, who serves as chief technology officer of the new company, says the product represents a new class of agricultural product — *agra-solar* crops. "Not only are they renewable and sustainable, they also add to a value-added microeconomic expansion by displacing high-value crops such as tobacco." Moreover, pokeberry is highly drought tolerant and because it's so robust, it doesn't require petrochemical fertilizers. Says Carroll, "From developing communities in Asia and Africa, to the guy in North Carolina with 40 acres and a tobacco barn, agra-solar crops like pokeberry can be a game changer. They are a way of replacing refined oil products or the high processing costs of silicon with locally sourced resources that can be produced over and over and yield a substantial profit per acre." Look for these solar cells to hit the market by 2012.

[1] Miller-McCune Newsletter, September 14, 2010