Off-the-shelf dyes improve solar cells

August 31 2010

Like most technologies, work on solar devices has proceeded in generational waves. First came bulk silicon-based solar cells built with techniques that borrowed heavily from those used to make computer chips. Next came work on thin films of materials specifically tailored to harvest the sun's energy, but still more or less borrowed from the realm of microelectronics manufacturing. Then came the third generation, described by one researcher and blogger as "the wild west," which among other objectives aims to build inexpensive next-generation solar cells by relying on decidedly low-tech wet chemistry.

In a paper in the *Journal of Renewable and Sustainable Energy*, which is published by the American Institute of Physics, Ram Mehra of Sharda University in Greater Noida, India, reports success in boosting the ability of zinc oxide solar cells to absorb visible light simply by applying a blended mixture of various off-the-shelf dyes commonly used in food and medical industries.

Working with colleagues from the University of Delhi, Mehra doused cells with a variety of dyes in a soak-then-dry procedure not unlike that used to color a tee-shirt in a home washing machine.

The best result came from a blend of dyes -- including Fast Green, a food dye used in canned vegetables, jellies and sauces and Rose Bengal, used in diagnostic eye drops to stain damaged cells and identify eye injuries -- that together boosted the efficiency of zinc oxide solar cells by nearly eight percent. Mehra and colleagues say that in the future, specific dye blends might be formulated to make solar cells targeted for

specific uses, much as custom mixing of dyes today yields products as diverse as adhesives, cosmetics, and perfumes. They write that "by changing composition of the mixture, its properties will change to be more or less suited to a particular useful application."

More information: The article "Development of a dye with broadband absorbance in visible spectrum for an efficient dye-sensitized solar cell" by Seema Rani, P. K. Shishodia, and R. M. Mehra appears in the *Journal of Renewable and Sustainable Energy*. See: link.aip.org/link/JRSEBH/v2/i4/p043103/s1

Provided by American Institute of Physics