DSC recipe brings good news to solar cell economics

November 6 2011, by Nancy Owano

A discovery in how to make solar cells cheap enough to boost the use of solar energy looks promising according to experts. The design represents an inexpensive process making use of an organic, printed dye to absorb sunlight. The study, reported in *Science* magazine, is seen as a welcome step forward in the search for cheaper, efficient, solutions for solar energy.

Electrochemist Michael Graetzel at the Swiss Federal Institute of Technology in Lausanne, who back in 1991 had devised a dye-sensitized solar cell (DSC),and his team are credited with sidestepping a roadblock that prevented DSCs from becoming commercially viable.

Researchers and manufacturers were using the rare and expensive metal ruthenium (ru)in the dyes and could get only low voltages in the cells Graetzel invented back in 1991. Between both issues of lower cell efficiency and higher costs of ruthenium, there was work to be done. Now Graetzel and his colleagues believe they have found sound alternatives to the expensive dyes and iodide mediators limiting voltage.

They chose a zinc-bearing compound similar to chlorophyll to build a newer type of solar cell. For dyes, they use molecules consisting of a group that loses electrons, a group that accepts them, and a unit that has a light-absorbing group similar to that in chlorophyll. DSCs in their current design enable an efficiency of 12.3 percent. They hope to achieve efficiencies of 15 percent. That would render a more realistic alternative to semiconductor-based photovoltaics.

Graetzel says he is working on these and other improvements. He is adapting the dyes to capture more of the red component of sunlight, and testing new cobalt mediators to boost the voltage.

Meanwhile, according to a report in Scientific American, scientific interest continues in the potential of inexpensive thin-film photovoltaic cells made from organic plastics, as a way to boost the production of solar power.

Organic photovoltaics do not require any liquids and they can be made using existing machines. Engineers Vasilis Fthenakis and Annick Anctil of the Brookhaven National Laboratory commented on this approach in an e-mail to the magazine.

A separate report late last month said Belgian research institute Imec will lead a consortium of 17 organizations and companies to develop a commercially-viable organic photovoltaic technology. TheX10D project is funded by the European Commission(EC). The project carries the twin purpose of achieving efficiency of organic solar cells while keeping down manufacturing costs.

"By applying new designs and architectures, materials and manufacturing technologies, the X10D project aims at increasing the power conversion efficiency to achieve at least a 12% on cell level (1cm^2), and 9% on module level (100 cm^2)," according to Imec.