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Your guide to Renewable Energy

The Significant Saver

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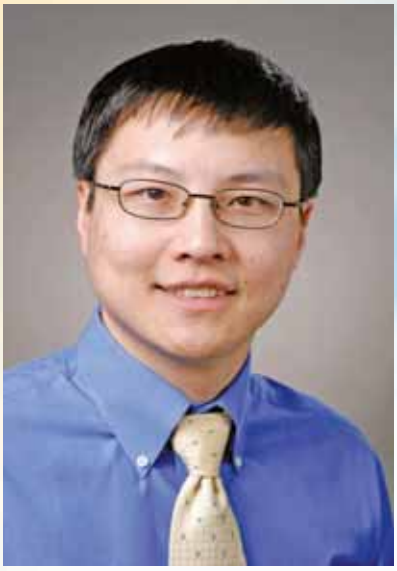
Inspired by sunflowers

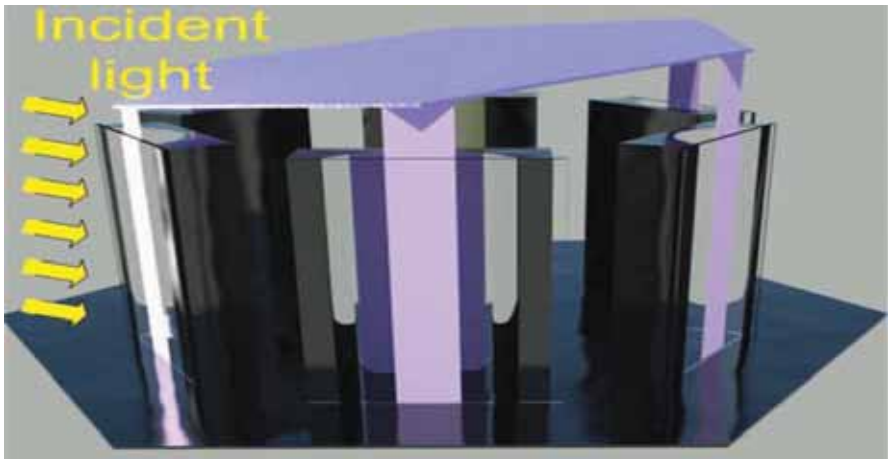
Unlike conventional solar cells, they mimic the sunflower's motion which tracks the sun and harnesses energy. What's more, they do this with far greater efficiency. Hongrui Jiang tells **Sapna Gopal** about the sun-seeking panels which track the sun passively, without using energy and what this means for the sector

It inspires ideas, spurs thoughts and results in innovations which may possibly alter our lives for the better. Time and again, nature has proved that when it comes to inspiration, it is probably the best bet.

Maybe this is what prodded a team of US researchers at the University of Wisconsin-Madison led by Hongrui Jiang, who realised that the concept of sunflowers tracking the sun during the day, could be replicated in the solar segment too. Akin to the sunflower, they developed panels which move in response to the sun's light. The thought behind the concept is that while the panels are static, the sun isn't. It led to the team developing panels which mimic the sunflower's motion, increasing their efficiency by 10 per cent.



> ***The technology is likely to be beneficial in countries where there is ample sunshine. As the artificial heliotropism is triggered or directly driven by sunlight, more the sunshine,the better it works***



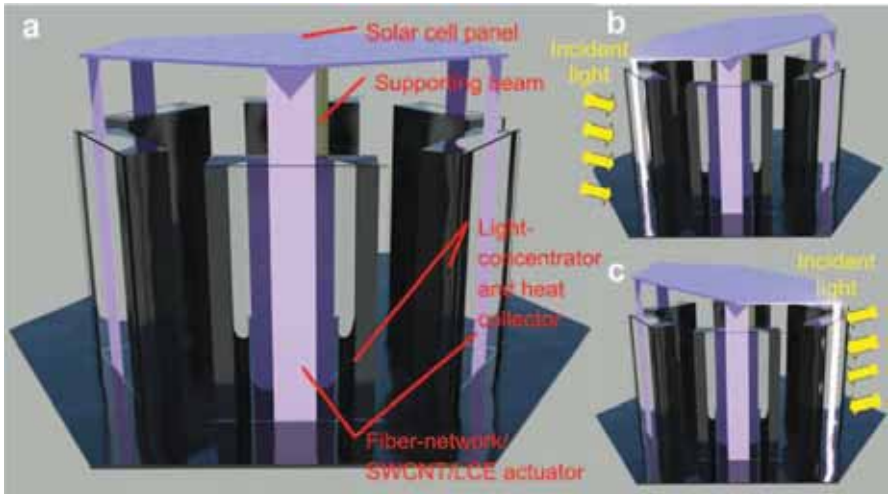
As of now, most systems depend on the Global Positioning System (GPS) and motors to realign the panels with the sun's position, but use 2 to 3 per cent of the energy collected by the panels, while the new system responds to the heat generated by the sun. It is these energy savings which impart this system a competitive edge, affirms Hongrui.

Explaining how these work, he states, "The solar panels are supported by actuators. While facing the sun, the actuator(s) will be triggered to contract, thus pulling the solar panel to face the sun. When the sun moves away, the previous actuator(s) will restore to its original state and new actuators facing the sun will then make the solar panel rotate to face the sun again."

In the system which has been designed and developed, it depends on a liquid crystalline elastomer (LCE), with tiny carbon fibres. For this, a type of LCE that contracts when heated up, is used. "We incorporate carbon nanotubes (CNT) into the LCE matrix. CNTs absorb light and generate heat to make the LCE contract," adds Jiang.

The work, he reveals, was inspired by heliotropism, or solar tracking, of many plants. "Their leaves and/or flowers can follow the sun for more light interception. If solar panels can follow and face the sun all the time, their electricity output will be significantly increased."

Stating that he wanted to track the sun without using electricity, Jiang reveals that they demonstrated the possibility in the paper "Direct sun-driven artificial heliotropism for solar energy harvesting based on photo-thermo-mechanical liquid crystal elastomer nanocomposite." The artificial heliotropic motion was triggered by sunlight directly and no electricity was consumed.



Interestingly, it is the regular solar panels which have been used in the innovation. "The aim is to make the solar panel face or follow the sun. Hence our method is independent of solar cell technology. The increase in electricity output owing to our approach is on top of any increase due to the improvement in the conversion efficiency of the solar cell itself," Jiang eludicates, on why they opted for the conventional solar panels.

The feasibility and workability has been demonstrated in the research paper, with both a laboratory and an "in-field" test. Since it is in the research stage currently, it's not used commercially yet. However, work is being done that in mind.

The technology is likely to be beneficial in countries where there is ample sunshine. As the artificial heliotropism is triggered or directly driven by sunlight, more the sunshine, the better it works. In fact, this was demonstrated in the preliminary work which Hongrui and his team did in Madison, WI, USA in summer.

Presently though, they are looking at ways to refine their materials for use in larger solar panels so that in a couple of years, it will be ready for large-scale use in industrial solar farms.