

IITH develops low-cost, eco-friendly solar cells using ‘kumkum dye’



Dye-sensitised solar cell (DSSC) is a third-generation thin-film organic molecule-based energy conversion device.

Scientists at IIT Hyderabad have developed low-cost, environment-friendly solar cells by employing an off-the-shelf dye used to make kumkum or vermilion in India. The dye-sensitised solar cell (DSSC) is based on New Fuchsin (NF) dye with aqueous electrolyte and platinum-free counter electrodes, according to the research published in the *Solar Energy* journal.

The most familiar solar cells today are made up of silicon and can be seen in the various overhead panels and other places, noted Professor Sai Santosh Kumar Raavi from Department of Physics, Indian Institute of Technology (IIT) Hyderabad. However, this technology is limited by huge fabrication costs as silicon processing is very expensive and involves very high temperature methods that leave a large carbon footprint, Raavi, who led the project, told PTI.

In order to get around the limitations of using silicon, the IIT Hyderabad team started working on solar cells based on organic materials, which were supposedly inexpensive and easy to fabricate. However, there were many drawbacks impeding the organic photovoltaic technology as organics (plastic) are less robust. Many dye molecules developed for efficient DSSC devices are very expensive and toxic upon ingestion. Also, most DSSC devices tend to get degraded as they come in contact with atmospheric moisture, Raavi said.

Since 2010, lot of efforts have been made to use water-soluble natural and synthetic dyes to make water-based solar cells. In their latest work, Raavi's team consisting of researchers from Department of Physics and Chemistry (IIT Hyderabad), ARCHEM (University of Hyderabad) NIT Kurukshetra and IFSC-USP, Brazil, employed a very cheap magenta-dye called New Fuchsin, which is used to make kumkum or vermilion when grounded with turmeric.

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