

KERALA

NIIST takes energy quest to a new level



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Path-breaking: NIIST officials display a DSC module developed by them. Seen are NIIST director A. Ajayaghosh (right) with scientists Suraj Soman (centre) and Narayanan Unni.

Develops cost-effective dye-sensitised solar cell

Inside a gleaming, custom-designed lab at the National Institute for Interdisciplinary Science and Technology (NIIST) at Pappanamcode, a silent revolution that could take India's quest for cost-effective energy production technologies to a whole new level has been taking place.

For the first time in the country, NIIST researchers and their industrial partner, Elixir Technologies, Bengaluru, have succeeded in establishing an indigenous, semi-automatic fabrication unit for manufacturing dye-sensitised solar cell (DSC)-based modules.

What makes the achievement remarkable is that they have realised a cost-reduction of as much as 50% to 60% in module fabrication equipment. The NIIST has also succeeded in developing DSC modules of up to 30 cm x 30 cm in size.

"DSC belongs to third-generation photovoltaics and, in simpler terms, they mimic natural photosynthesis. Across the globe, the technology has been under development for over two decades. Unlike conventional solar cells which require sunlight, DSCs can function even in low, artificial or indirect light which make them ideal for indoor use," Suraj Soman, scientist, Chemical Sciences and Technology Division, NIIST, said.

More flexible

DSCs are a lot more flexible than conventional, first generation silicon solar photovoltaics and can be integrated with a wide range of surfaces; plastic, glass and metal included. "You can even change their colours by changing the dyes used, making them more pleasing to the eye. DSCs can find application in Building Integrated Photovoltaics (BIPV) as power-producing glass facades," Narayanan Unni, Principal Scientist, Chemical Sciences and Technology Division, NIIST, said.

So, why DSCs? Sample this scenario. By 2020, there would be close to 50 billion connected smart devices worldwide powered by batteries. Imagine the sheer volume of used batteries that would need to be disposed of every year. DSCs offer a way out, NIIST researchers said.

With their ability to harvest indoor/artificial light, they can make smart devices self-powered. Theoretically, DSCs are also cheaper to produce, the raw materials being easily available.

High priority

Funded under a Department of Science and Technology-Solar Energy Research Initiative (DST-SERI) programme, the DSC module fabrication line was commissioned at the NIIST in November 2018. That the project is listed in PMO's high-priority implementation category signals its importance, NIIST officials said.

Established with the help of Elixir Technologies, the unit, furthermore, is an example of the Make in India initiative as well as the synergy between academia and industry. "If we had imported the same equipment, the cost would have run into crores. We managed to establish the unit at a much lesser capital investment," Suraj Soman, who is a recipient of the Kerala State Young Scientist Award, said.

"We had lacked the expertise for manufacturing production equipment for photovoltaic technologies in India. We were forced to depend on technologies elsewhere or import them at a high cost. Now, we can confidently say that we have addressed this gap to a great extent and at a considerably lower cost. What we have created here is a unique facility which is not available anywhere in the country at the moment," NIIST Director A. Ajayaghosh said.

The NIIST is making extensive, interdisciplinary efforts to nurture a complete supply chain in the area of DSCs. Additionally, the project also addresses the lack of skilled manpower in the area of third generation photovoltaics by training PhD students and project fellows, NIIST officials said.

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