Manufacturing: Lightweight PV gets into gear

The manufacturing category honors the latest and greatest developments in PV's upstream segment, from the raw materials and components that go into PV modules, batteries and other devices, to the processes and machinery used to bring them all together. While cost will always be king in the upstream segment, this year's winner represents both a new technology and an emerging market – reflecting the importance being placed on applications for PV beyond the usual power plants and rooftop installations.

PV manufacturing has had a rough year in 2021, with rising material prices and shortages of both electricity and shipping containers impacting availability. But manufacturers have pressed on with bringing larger formats and n-type technologies to large-scale production, both expected to help lower energy costs in the longer term. And the winner gives a nod to encouraging moves toward integrating solar generation in new applications and environments. Among this year's award entries in all categories we have seen exciting new products introduced for agrivoltaics as well as floating and building integrated PV, and in this case, an innovative and practical process to integrate solar power into vehicles.

Winner

Sono Motors: Vehicle integrated PV solution

Integrating solar power directly into other industries and aspects of our lives is sure to be an important strategy in future decarbonization and electrification efforts, and there is already plenty of buzz surrounding the possibility of vehicle-integrated photovoltaics. Sono Motors impressed our jury with its practical process that integrates solar into the vehicle manufacturing process.

The single-step process embeds solar cells into a polymer during the actual molding of the panels making up the vehicle body. This allows for solar cells to be integrated across the vehicle's entire surface including over complex curved surfaces. Vehicle body panels integrated with PV cells do not weigh significantly more

The Jury

Alex Barrows
Alex Barrows is the research director at Exawatt. He focuses on when and how new technologies will influence the solar PV market, and oversees PV market data analysis for the company. He obtained his PhD in the physics of perovskite-based solar cells from the University of Sheffield.

Alison Ciesla
Alison Ciesla is a Scientia Research Fellow at the University of New South Wales, Sydney. Through collaboration with industry, she specializes in understanding defects and hydrogen in commercial solar PV cells, especially regarding the degradation and reliability of PV modules.

Jonathan Govaerts
Jonathan Govaerts earned his PhD from Ghent University in 2009, with a focus on packaging and interconnection technology for flexible electronics. He has since worked with the solar cell group at imec, where he focuses on cell-module integration of silicon PV cells.

than standard sheet metal panels, and are blended into the vehicle exterior, making them almost invisible.

Sono works with monocrystalline, interdigitated back contact cells integrated into a polymer matrix that serves as both front glass and backsheet. Since these materials are already in use in both the PV and automotive industries, the company says it can achieve a 95% recycling rate. The company estimates that a mid-sized electric vehicle, such as the Sion it produces in house, can be fitted with more than 1kWp of PV capacity using this solution. Based on the climate in Munich, where the company is based, Sono estimates its VIPV solution can achieve an LCOE of €0.12, and generate enough charge to travel 112 km per week on average.

Jury comments:

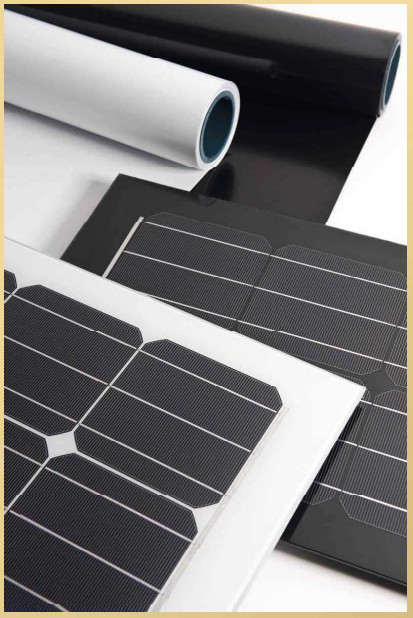
Alison Ciesla: VIPV is not a new concept, but this is the first I have seen that is integrated quite aesthetically well. And the range they say can be achieved, even on wintry days, is impressive. The fact that it is also recyclable is excellent.

Jonathan Govaerts: Technologies like this will only grow in importance, and their approach with lightweight materials will hopefully reflect onto other markets beyond vehicle integrated PV.

Alex Barrows: This points to the direction that the electric vehicle industry will likely take in years to come. Buying a car is about much more than LCOE, and tagging solar onto an already high ticket price item in order to enhance its functionality and appeal offers a whole new market to add to the usual rooftop and utility systems, which have a quite different set of considerations.

Highly commended

Coveme: Dymat High Barrier Backsheet and DuPont Teijin Films: Mylar based backsheet



The jurors also found two manufacturers worthy of a special mention for their innovations and focus on sustainability in backsheet manufacturing. Both Coveme and DuPont Teijin Films (DTF) have been able to integrate recycled materials into their backsheet products. DTF is recognized for its LuxCR process, which allows it to convert waste polyethylene terephthalate into a material that it can use in new backsheet films. The company is already offering backsheet films with 33% recycled PET, which it says have properties indistinguishable from those made with new material.

Coveme has also integrated up to 40% recycled PET into its dyMat range of high barrier backsheets, which come in black, white and transparent, and says its has plans to increase this percentage in the future. And Coveme stresses that its backsheet is completely PET based, not containing aluminum, which is more common for backsheets requiring very low water vapor transmission rates.

Jury comments:

Alison Ciesla: Being able to recycle modules and use recycled materials is a very important approach and I am not aware of anyone else doing it in the backsheet space. And there is potentially a huge impact, because with the transparent option as well it can reach virtually all types of module.

Jonathan Govaerts: The sustainability aspect here is very convincing.

Other finalists

- Teknisolar – Robostak Laminator
- Coolback – Combined frame & backsheet solution