Top quality solar solutions from North America

Words: Itai Suez, PhD, VP Product Development, Silfab Solar

Silfab Solar is a North American manufacturer of high-efficiency, premium quality solar panels and solar solutions. Our company leverages over 35 years of experience spanning the entire vertical Photo Voltaic value chain including R&D, engineering and product innovation. With our experience in the PV industry, premium product offering and our nimble business model, the company gained traction and business success in the US market over the past few years, competing against foreign manufacturers who could not offer the flexible solutions, delivery options or the quality products demanded by US customers. Silfab currently operates out of two fully automated manufacturing facilities, one in Toronto, Canada and the other in Bellingham, Washington, US.

Itai Suez

Recognized as a 2020 PVEL Top Performer for both our conventional and MWT modules, Silfab continues to develop new PV manufacturing processes and technological innovations that leverage strategic partnerships such as this one with DSM Advanced Solar to manufacture premium, high efficiency, MWT solar modules exclusively for the North American market.

MWT is an acronym for a PV cell technology that has been designed specifically on crystalline silicon type solar cells. It stands for Metal-Wrap-Through (MWT). MWT redirects electrical current from the emitter region, typically on the front side of the cell, to the back of the cell by formation of holes or 'vias'. Metallization paste is then printed into these vias/holes and fired into the cell so that the generated current can be extracted from the backside for both the emitter and contact regions: positive and negative terminals. Therefore, the additional metal that would normally have been shading the front side of the cell, or preventing the cell from absorbing sunlight and converting it into electrical current, is effectively eliminated in order to increase the cell's conversion efficiency. We are currently the only manufacturer to bring this unique and important technology to North America in a joint venture partnership with DSM Advanced Solar who designs and manufactures the electro-conductive backsheet (ECBS) component.

Silfab's all back-contact, electro-conductive backsheet (ECBS) manufacturing line in Bellingham, WA features a novel and elegant design that enables PV module assembly via a series of processes that reduces manufacturing steps and completely

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replaces the use of cell stringing, module lay-up, and bussing operations. Many of these traditional PV module designs and manufacturing processes are related to higher degradation rates in the field, such as the creation of micro-cracks in the cell, which are simply eliminated in this type of back-contact design.

Traditional cell to cell stringing relies on high temperature solder to form a mechanical and electrical bond with copper ribbon or wire. Due to the high temperatures used in the formation of the ribbon/wire interconnection on the front of the cell, high residual stress remains locked in throughout the life of the module. Repeated mechanical loads and thermal cycling will cause micro-cracks to form and propagate into full-sized cell cracks which can significantly lower power output from the module. With the back-contact/ECBS design, the bonded interconnection between the cell and the external electrical circuit is formed at much lower temperatures during the module lamination process. This not only eliminates another step in the module manufacturing process, it simultaneously improves a key element of the module’s long-term reliability improving performance and durability.

There are other several key advantages to this premium MWT product worth mentioning; flexibility in interconnection design, improved performance and enhanced aesthetics which is desired by North American homeowners.

The all back-contact ECBS product easily allows for near infinite possibilities in the module interconnection design. For example, we could make an asymmetric design using 126 half-cells instead of 120 half-cells which would be impossible to do with a conventional string/bus design.

In addition, on account of the integrated metallic foil in the backsheet which serves primarily as the functional interconnection circuit of the PV module, there is an added benefit that the metal directly behind the cells also functions as an effective heat spreader. This means that the modules typically run ~4-6 degrees cooler than conventional black-on-black modules at NOCT conditions. As well, the flexibility in the interconnection design allows for easily optimizing the modules’ performance with regards to how the module efficiency changes as a function of plane-of-array (POA) irradiance conditions relative to other prevalent residential modules on the market.

Overall, when comparing Silfab’s all back-contact ECBS modules’ performance to conventional modules using a 1:1 system design, via PVSyst simulations, there is roughly a 3% increase in annual energy production (AEP) in various climates on a kWh/kWp basis. That’s watt for watt of PV module power.

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After introducing the MWT module in 2019 with a 330Wp product, we will be migrating to a larger wafer/cell size and slightly improving the design of the back-contact solar cells. As such, our modules will go from 330Wp ~19.5% efficiency to a 365Wp ~20.5% efficiency by the end of Q4 2020, all manufactured out of our US facility. This next generation Silfab MWT module will be one of the most powerful and efficient PV modules manufactured and sold exclusively to US homeowners and backed by our industry leading 25-year product and 30 linear performance warranty.

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Bio

Itai Suez, PhD

Itai joined Silfab Solar in June 2019 as Vice President of Product Development following several years working on the downstream side of the business in Houston, TX developing utility-scale projects at EDP Renewables NA.

He holds a PhD degree in Chemical Engineering from UC Berkeley, where he specialized in semi-conductor-based research, which paved the way for his future career and passion in silicon-based solar cells and modules.