

# Patent for breakthrough solar PV cell architecture issued to Solar Inventions

*Technology proven to reduce silver costs and increase power generation with no capital investment by manufacturers*

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*Bill Nussey, CEO, Solar Inventions*

and Trademark Office has awarded Solar Inventions a patent on its new and improved architecture for solar photovoltaic cells, the company announced today, opening the door to commercial acceptance and licensing by leading manufacturers.

The invention, called Configurable Current Cells, or C3, creates silver savings of up to 12%, over US \$1 million in savings per gigawatt at current silver prices. C3 also improves cell, module, and system performance. The improved cells and panels can be made on existing PV

factory lines, without any new equipment or materials.

With U.S. Patent No. 11,145,774 in place, Solar Inventions will be finalizing pending C3 patents in China, Europe, India, Japan, Australia, South Korea, Mexico, Israel, United Arab Emirates, Egypt, Brazil, Saudi Arabia, Canada, Turkey, Vietnam, and Taiwan, which together account for 90% of the worldwide solar market.

Chief Technical Officer Dr. Ben Damiani recently presented two major papers on the technology to two international conferences ([IEEE PVSC in the U.S.](#) and [EUPVSEC in Portugal](#)). The first looks at boosting a solar module’s performance by using the C3 technology to increase the cell-to-module ratio. The other explains the science behind the silver savings.

“For example, a 9 bus bar PERC solar cell would save approximately \$1 million in silver per gigawatt of production, while improving performance by 2-3 watts per panel for an additional \$1-2 million worth of power gains,” Damiani says. “With the industry shipping almost 200 GW of solar cells per year, C3 has the potential for \$400 million to \$600 million in annual industry-wide impact.”

“Our global IP portfolio is coming together,” said Bill Nussey, CEO of Solar Inventions. “This

patent opens the door for us to move forward on joint ventures with key partners in areas with large-scale cell and module manufacturers, such as India, China, Southeast Asia, the EU, and the U.S. We've begun discussions with potential partners in all of these regions."

Gregg Freishtat, Chief Commercial Officer, added, "We expect these partnerships to develop a stream of new inventions and IP that will be co-owned with our partners, and marketed in those regions and worldwide by Solar Inventions. We expect our joint venture partners will share in a substantial portion of all licensing revenue in their region."

Bill LaFontaine, a member of the Solar Inventions Advisory Board, oversees one of the largest patent portfolios in the U.S. as General Manager of Intellectual Property for IBM. "For such a widely used product as a solar cell, it is unusual to see brand new ideas like this," LaFontaine commented.

"It's exciting to see something brand new like C3," said another advisor to the company, Abasifreke (Aba) Ebong, Professor and Director of the Graduate Program in Electrical and Computer Engineering at the University of North Carolina at Charlotte. "The resistively bounded subcells in C3 have the promise to spawn a whole family of new innovations."

Rapid advances follow discovery in 2017

The Solar Inventions patent stems from the work of Damiani, a veteran inventor in the solar and semiconductor sectors who previously worked at Suniva and Intel, and is now the company's Chief Technical Officer.

Damiani discovered he could create multiple "lanes" or subcells on a single wafer by electrically dividing each cell during the metalization process. This technique effectively creates a new cell architecture, opening the door for multiple innovations beyond C3.

To commercialize his discovery, Damiani co-founded Solar Inventions with Nussey and Freishtat in January 2018.

By early 2019 the new cell architecture was advancing in the U.S. Department of Energy's first American-Made Solar Prize contest for innovative technologies. In September 2019, Solar Inventions won first place, pushing its total prizes to \$800,000.

The company used the prize money to manufacture several iterations of pilot cells and modules, and obtain independent third-party confirmation testing from CFV, NREL, and Sandia National Laboratory. The C3 technology was tested and silver savings confirmed on monocrystalline PERC, HJT, n-type, half-cells, and bi-facial cells.

Cherry Street Energy, one of the largest and most innovative renewable energy providers in the Southeast, placed the first order for C3 cells for an installation on the roof of Creature Comforts

Brewery in Athens, Georgia.

Meanwhile, during the early months of the pandemic, silver spiked over \$24 an ounce for the first time since 2013 and has continued to trade in that range, making the C3 technology all the more appealing.

Invention works on existing factory equipment

“The benefits are similar to half-cells, also a major solar industry trend, but without requiring cells to be physically broken and rewired,” said Damiani.

He added, “As the industry continues to trend towards large wafer sizes, our C3 technology actually has an even bigger impact. The added flexibility of the subcell architecture allows for new ways to limit the negative impact of power loss due to higher electrical current, which is directly related to the size of the wafer inside a solar module.”

“If even half the U.S. solar industry adopted this architecture, hundreds of millions of dollars a year worth of added solar power would result,” said Nussey.

Damiani described his invention in a 2020 white paper, *Introducing resistively bounded subcells: The lowest-cost method of increasing PV efficiency while improving safety and energy production*, which remains [available for free download](#) from the company’s website.

Manufacturers may license the technology by contacting Gregg Freishtat, Chief Commercial Officer, at [gregg@solarinventions.com](mailto:gregg@solarinventions.com).

#### About Solar Inventions

Solar Inventions was created to accelerate the pace of innovation in solar and other clean energy solutions. Our Configurable Current Cells (C3), based on the work of Dr. Ben Damiani, won the first-ever American-Made Solar Prize from the U.S. Department of Energy in 2019 for breakthroughs in photovoltaics that expand the flexibility and effectiveness of traditional solar technology without requiring new equipment or manufacturing techniques. Learn more at [www.solarinventions.com](http://www.solarinventions.com)

Peter L Kelley  
RenewComm LLC  
+1 2022708831  
[email us here](#)

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