

A PV Technician on Your Roof Day and Night

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“A chain is no stronger than its weakest link,” the saying says. And that also applies to solar panels today. One bad working cell can bring down the panel's electricity production significantly. The reason is that the solar cells are connected in series, making a malfunctioning cell a huge resistive link in the chain.

Imagine for example that lightning or hail storms damage part of your solar panel, or bird droppings contaminate it, or your neighbor's satellite dish puts a shadow on some of the cells in the solar panel. What to do other than cursing the PV manufacturers' brochure showcasing the 'ideal' power output for your solar panels.

Today, researchers are developing a more real-life proof PV module concept. It makes use of miniaturized components which are integrated during solar cell or panel production. These chips act as the eyes and hands of a PV technician being constantly present at your roof, controlling your PV installation. First of all, it concerns electronic sensors monitoring the output voltage of each cell. If a cell is underperforming, the electronic 'hands' come in action: ultra-low-loss switches are able to reconfigure the network of solar cells within the panel. In this way, malfunctioning cells can be bypassed, cranking up again the output of the PV panel. Integrated on-off switches in the PV panel would also allow it to lock up the panels when necessary (for example, during maintenance, in case of fire or as antitheft protection).

The key is to develop miniaturized low-cost long-live electronic sensors and switches to realize this reconfigurable panel architecture. Also, the module manufacturing process has to be adapted to allow adding the electronic components in an elegant and cost effective way to the modules, and to seamlessly interconnect them with the PV cells.

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About the Author

Philip Pieters received his Masters and Ph. D. degrees in electrical engineering from the Katholieke Universiteit Leuven in Leuven, Belgium. He joined imec in 1994 doing pioneering R&D work for innovative heterogeneous integration and RF-SIP technologies. Today, he is business development director Energy, creating the bridge between imec's hightech research on PV technologies and the market needs. For more information, visit www.imec.be [1]

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