



Suniva Collaborating with Varian Semiconductor on Advanced N-Type Solar Cell Using Boron Implantation

Suniva Targets 20 Percent Efficiency for Screen-Printed Solar Cells on N-Type Wafer

Norcross, Ga. – February 15, 2011 – [Suniva, Inc.](#), a U.S. manufacturer of high-efficiency [monocrystalline silicon solar cells and modules](#), today announced that it is working with Varian Semiconductor Equipment Associates (NASDAQ: VSEA) to use ion implantation of boron in the manufacture of solar cells. This collaboration will enable Suniva to use fewer processing steps in the mass production of its next generation n-type cell product, ARTisun *Star*. ARTisun *Star* is scheduled for production in the first quarter of 2012 with targeted cell efficiencies that will approach 20 percent.

Based on years of development collaboration with Varian Semiconductor, Suniva announced last week that it is using ion implantation of phosphorous on p-type wafers to [achieve 19 percent efficiency](#) on its second generation ARTisun *Select* cells. Suniva and Varian expanded their development partnership in February 2010 to focus on the utilization of n-type wafers and boron implantation. The use of n-type wafers in the third generation ARTisun *Star* cells completely eliminates Light Induced Degradation (LID) and provides a higher lifetime material, which is consistent with Suniva's objective to be the leader in high-efficiency, low-cost cell manufacturing.

Leveraging both boron and phosphorous implantation, Suniva has already produced 19.1 percent efficient n-type solar cells on 156 mm production wafers, which have been certified by Fraunhofer. In addition, the National Renewable Energy Laboratory has certified 20+ percent efficiencies on several laboratory-scale cells that utilize Suniva's advanced designs for ARTisun *Star*.

"Suniva's ability to already achieve verified conversion efficiencies of over 19 percent on 156 mm size n-type production wafers using low-cost techniques, such as conventional screen printing of metal contacts and use of an ion implanted uniform emitter and back-surface field, is unrivaled; it is a testament to the company's commitment to solar cell research and development," said Dr. Ajeet Rohatgi, Suniva founder and CTO. "I fully expect Suniva will have even higher solar cell efficiencies verified in the near future as we execute on our clear development roadmap to eventually achieve 22 percent conversion efficiency."

"Ion implantation is an enabling technology for advancing the solar industry roadmap towards grid parity. Precise single-sided doping control, species flexibility and process simplification are key requirements for cost-effective, high-efficiency cell designs," said Jim Mullin, VP/GM of the Solar Business Unit at Varian.

Suniva believes it is the only manufacturer of high-efficiency silicon solar cells that has achieved certified conversion efficiencies of more than 19 percent on 156 mm n-type wafers using low-cost techniques, including conventional screen printing and ion implantation of both a boron homogeneous emitter and a phosphorus back-surface field. This efficiency milestone was made possible through processes and intellectual property initiated by Dr. Rohatgi and chief scientist Dr. Dan Meier, and further developed in the company's R&D lab. Suniva's collaboration with Varian Semiconductor on ion implantation equipment will continue to contribute to this success and to the success of Suniva's mission to develop and manufacture cells and modules that are sensibly balanced between low-cost and high-efficiency – eventually approaching the cost of electricity produced by fossil fuels.

“Our broad and deep partnership with Suniva, extending over multiple years, has yielded a process and equipment solution for volume manufacturing of high-efficiency n-type cells with low-cost, high-yield and exceptional binning,” said Dr. Paul Sullivan, VP of business development at Varian. “The combination of boron implantation and precise patterned doping are critical steps in advancing the solar roadmap.”

About Varian Semiconductor

Varian Semiconductor Equipment Associates, Inc. is the leading producer of ion implantation equipment used in the manufacture of semiconductors. The company is headquartered in Gloucester, Massachusetts, and operates worldwide. Varian Semiconductor maintains a website at www.vsea.com.

About Suniva

Based in metro-Atlanta, GA, Suniva® manufactures high-efficiency monocrystalline silicon solar cells and high-power solar modules using patented low-cost techniques. Led by an internationally regarded team of business executives and photovoltaic scientists, the Company leverages exclusive licenses to critical patents and patent-pending intellectual property developed by founder and CTO Dr. Ajeet Rohatgi at the Georgia Institute of Technology's University Center of Excellence for Photovoltaic Research, which is funded by the Department of Energy. Suniva sells its advanced solar cells and modules worldwide and is dedicated to making solar generated electricity cost competitive with fossil fuels. For additional information on how Suniva is making solar more sensible in the global market, please visit www.suniva.com.

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