



# **Development of Black Silicon Antireflection Control and Passivation Technology for Commercial Application**

**Cooperative Research and  
Development Final Report**

**CRADA Number: CRD-12-475**

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## Cooperative Research and Development Final Report

In accordance with Requirements set forth in Article XI.A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

**CRADA Number:** CRD-12-475

**CRADA Title:** Development of Black Silicon Antireflection Control and Passivation Technology for Commercial Application

**Parties to the Agreement:** Natcore Technology, Inc.

### **Joint Work Statement Funding Table Showing DOE Commitment:**

<b>Estimated Costs</b>	<b>NREL Shared Resources</b>
Year 1	\$ 50,000.00
<b>TOTALS</b>	<b>\$ 50,000.00</b>

### **Abstract of CRADA Work:**

This work involves the development of a commercial manufacturing process for both multicrystalline and monocrystalline silicon solar cells that combines the National Renewable Energy Laboratory's (NREL's) black silicon technology and Natcore's passivation technology.

### **Summary of Research Results:**

NREL hosted three engineers/scientists from Natcore Technology, Inc. for three-and-half days shortly after the kickoff of the CRADA. The face-to-face meeting built team synergy while allowing the NREL team to transfer the licensed technology and knowledge to Natcore by demonstrating NREL's black silicon antireflection etching process as well as the diffused-junction solar cell fabrication in the laboratory.

NREL identified crucial design considerations as black silicon formation could be implemented at different stages of the solar cell processing sequence and found that emitter formation condition needs to be adjusted accordingly to optimize the black silicon solar cell performance. NREL also established a collaborative study with Prof. Mool Gupta at the University of Virginia to incorporate laser processing into solar cell fabrication and explored other potential applications of Natcore's passivation technology in silicon solar cell technology.

NREL's primary investigator presented the research result at the 38<sup>th</sup> IEEE Photovoltaic Specialists Conference in June 2012, and co-authored a publication titled *Antireflection and SiO<sub>2</sub> surface passivation by liquid-phase chemistry for efficient black silicon solar cells* on the conference proceeding with Natcore's team members.

**Subject Inventions Listing:**

None

**Report Date:**

April 24, 2014

**Responsible Technical Contact at Alliance/NREL:**

Hao-Chih Yuan

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