

PMC-ND
(1.08.09.13)

**U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION**



RECIPIENT: Georgia Institute of Technology

STATE: GA

PROJECT TITLE: Technology Development for \geq 23% Efficient P-PERC Solar cells

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001840	DE-EE0008562	GFO-0008562-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering, analysis, and dissemination Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)

B3.6 Small-scale research and development, laboratory operations, and pilot projects Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to Georgia Institute of Technology (Georgia Tech) to develop P-type Passivated Emitter and Rear Cells (P-PERC) and/or Passivated Emitter and Rear Poly (PER-Poly) cells at or greater than 22.5% efficiency. Traditional PERC cells would be physically modified to incorporate improvements to the solar cell, including the implementation of carrier selective passivated contact at the rear of the cell, the incorporation of advanced homogeneous phosphorous emitters at the front of the cell, advanced screen printing, and the substitution of p-Si junction cells with n-Si cells. The project would be completed over two budget periods (BPs), with a Go/No-Go Decision Point in between each BP.

Proposed project activities would include:

- Computer modeling and simulation (e.g. device modeling, design optimization)
- Development of homogeneous phosphorous doped emitters
- Development of tunnel oxide passivated contacts (p-TOPCon)
- Bulk lifetime enhancement via Tabula Rasa treatments with a conventional tube furnace
- Development of advanced screen printed metallization
- Fabrication of PERC or PER-Poly cells
- Development of a technology roadmap

All project activities would be performed at existing, purpose-built laboratory facilities owned and operated by Georgia Tech (Atlanta, GA). No changes in the use, mission, or operation of existing facilities would be required, nor would any additional permits be needed in order to realize the work activities proposed as part of this award.

The project would involve the use of hazardous materials including toxic and/or pyrophoric gases (e.g. silane and ammonia) and industrial chemicals, including hydrofluoric acid, piranha solution (H₂SO₄:H₂O₂ mixture), solvents, and detergents. All handling of hazardous materials would be carried out indoors, in laboratory settings using standardized equipment and procedures. Any risks associated with the handling of these materials would be

mitigated through adherence to established health and safety policies and procedures. Protocols would include health and safety training, enforcement of personal protective equipment, monitoring, oversight, and engineering controls. Work with chemicals would be performed under fume hoods. Georgia Tech would adhere to all Federal, state and local health and safety laws and regulations.

Gases would be stored in self-contained gas cabinets equipped with leak sensors. All gases would be scrubbed before release to remove hazardous components. Chemicals would be stored in marked storage cabinets. Acidic and basic chemicals would be neutralized prior to disposal. Solvents would be stored after use and disposed of in accordance with regulations established by Georgia Tech's Environmental Health and Safety Office (EHS). Georgia Tech would observe all Federal, state and local waste disposal and environmental laws and regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office

This NEPA determination does not require a tailored NEPA Provision.

NEPA review completed by Jonathan Hartman, 12/20/2018

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____

 **Kristin Kerwin**
NEPA Compliance Officer

Date: 12/20/2018

FIELD OFFICE MANAGER DETERMINATION

- Field Office Manager review not required
 Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____

Field Office Manager

Date: _____