

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Alan Sellinger/Colorado School of Mines**STATE:** CO

**PROJECT TITLE** Perovskite Solar Cells: Addressing Low Cost, High Efficiency, and Reliability through Novel Hole  
 : Transport Materials

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0001654	DE-EE0008174	GFO-0008174-001	

**Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), 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 Colorado School of Mines to develop low-cost and scalable organic-based hole transport materials for thin film perovskite solar cells with high efficiencies and long lifetimes.

The proposed project would involve laboratory scale research and development of new hole transport layer materials (HTMs), a component of perovskite solar cells. Associated activities would include the design, synthesis and characterization of chemicals/materials, in addition to perovskite device fabrication and testing. Materials design, chemical synthesis and characterization would occur in the General Research Laboratory at Colorado School of Mines (Golden, CO). Device processing and testing would take place at the National Renewable Energy Laboratory (Golden, CO). No change in the use, mission or operation of existing facilities would arise out of these efforts. The facilities have all applicable permits in place, and would not need additional permits for the proposed activities.

In addition to indoor accelerated testing of solar cell devices at NREL, it is anticipated that the proposed devices would be deployed outdoors at a previously established location at NREL for the purpose of collecting and analyzing lifetime data. No modifications would be required. The facility was purpose-built for the type of activity being proposed; therefore, no adverse impacts to sensitive resources are expected.

The proposed project would involve the use and handling of various hazardous materials, including solvents and toxic organic/inorganic chemicals. All such handling would occur in-lab, and materials development research would be conducted in fume hoods to ensure proper exhausting of solvent vapors. Both facilities are dedicated to proper hazardous material handling and disposal practices. All hazardous materials would be managed by existing infrastructure at Colorado School of Mines and NREL in accordance with federal, state, and local environmental regulations. No siting, construction or major expansion of waste storage, disposal, recovery, or treatment actions/facilities would be required.

Production of new materials would be small-scale. The proposed project would produce an estimated 250 grams of HTMs using approximately 50 gallons of solvents and lesser quantities of other chemicals. Most of the materials used would be consumed in the course of the proposed project, and there would be minimal generation of non-hazardous waste including standard laboratory supplies. No equipment would be decommissioned at the end of the proposed project.



Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Based on the review of the proposal, DOE has determined the proposal fits within the class of action(s) and the integral elements of Appendix B to Subpart D of 10 CFR 1021 outlined in the DOE categorical exclusion(s) selected above. DOE has also determined that: (1) there are no extraordinary circumstances (as defined by 10 CFR 1021.410(2)) related to the proposal that may affect the significance of the environmental effects of the proposal; (2) the proposal has not been segmented to meet the definition of a categorical exclusion; and (3) the proposal is not connected to other actions with potentially significant impacts, related to other proposals with cumulatively significant actions, or an improper interim action. This proposal is categorically excluded from further NEPA review.

#### NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If the Recipient intends to make changes to the scope or objective of this project, the Recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding. The Recipient must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved. If the Recipient moves forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of a final NEPA decision, the Recipient is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:

Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Note to Specialist :

Solar Energy Technologies Office  
This NEPA determination requires a tailored NEPA Provision.  
NEPA review completed by Whitney Doss, 08/09/2017

#### SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: \_\_\_\_\_

Electronically  
Signed By:

Kristin Kerwin  
NEPA Compliance Officer

Date: 8/10/2017

#### FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

#### NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

- ☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
- ☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

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

Field Office Manager's Signature: \_\_\_\_\_

Field Office Manager

Date: \_\_\_\_\_