

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** University of Washington**STATE:** WA

**PROJECT TITLE:** Approaching the Radiative Efficiency Limit in Perovskite Solar Cells with Scalable Defect Passivation and Selective Contacts

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0001840	DE-EE0008747	GFO-0008747-001	

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.

**B3.15 Small-scale indoor research and development projects using nanoscale materials** Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to the University of Washington (UW) to synthesize organic compounds for incorporation into lead-halide perovskite solar photovoltaic (PV) cells. The project would seek to improve perovskite solar cells' radiative efficiency by reducing recombination losses. The project would include fabrication of sample novel perovskite solar PV cells and material testing of the sample cells. The project would be completed over two Budget Periods, with a Go/No-Go Decision Point in between each BP.

Proposed project activities would include material synthesis, material validation (e.g. spectroscopy, elemental analysis, electrochemistry, and conductivity measurements), interlayer performance, synthesis, and processing optimization, and stakeholder engagement. All project activities would be completed by UW and its project partner, the Georgia Institute of Technology (Georgia Tech), at existing, purpose-built facilities. Test samples of semiconductor films, surface passivation agents, and interlayer materials would be produced and tested in controlled laboratory settings. No change in the use, mission or operation of any existing facilities would be required. Likewise, no additional permits or authorizations be needed.

Project work would include the use of industrial chemicals, lead halide salts, lead halide perovskite films, flammable solvents/organic solids, and compressed gases. Laboratory equipment would also be used which could present

electrical/burn hazards. Potential risks associated with the completion of project activities would be mitigated via adherence to established university health and safety policies and procedures. Protocols would include personnel training, the use of personal protective equipment (PPE), monitoring, and engineering controls. Hazardous chemical waste would be generated, primarily in the form of organic solvent solutions contaminated with lead. All hazardous waste streams would be stored and disposed of in accordance with established university Environmental Health and Safety (EHS) regulations. UW and Georgia Tech would observe all applicable Federal, state, and local health, safety, and environmental regulations.

Some project activities may include the formation of nanomaterials within solid PV films. Nanoparticles would be suspended in the films and would not be aerosolized as a result of project activities. Accordingly, inhalation risks would not be present during the project. Nonetheless, both UW and Georgia Tech would adhere to the established health and safety policies of their respective EHS departments associated with handling nanomaterials. Protocols would include the use of fume hoods and appropriate PPE.

## 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, 05/06/2019

## 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: 5/6/2019

## 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: \_\_\_\_\_