PMC-ND
(1.08.09.13)

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

RECIPIENT: Trustees of Dartmouth College **STATE:** NH

PROJECT TITLE: Thermodynamically stable, plasmonic transition metal oxide nanoparticle solar selective absorbers towards 95% optical-to-thermal conversion efficiency at 750°C

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001840	DE-EE0008530	GFO-0008530-001	

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 Dartmouth College to design, fabricate, and test solar selective absorbers that can be spray-coated or dip-coated onto receiver tubes for condensed solar power applications. The technology developed as part of this project would be demonstrated via a pilot-scale receiver tube system, tested at high temperatures. The project would be completed over a single Budget Period.

Proposed project activities would include computer modeling, coating design development, coating on coupon samples, thermal testing of coupon samples, material characterization, test tube coating, and performance testing on test tubes.

Design work and coating development would be completed at Dartmouth College's campus in Hanover, NH. Prototype tube coating and solar testing would be performed by sub-recipient Norwich Technologies at its laboratory facilities in White River Junction, VT. All project activities would be completed at existing, purpose-built laboratory facilities that regularly conduct work similar in nature to that proposed as part of the project's scope of work. No change in the use, mission or operation of existing facilities would be required nor would any additional permits or authorizations be needed.

Norwich Technologies would perform prototype tube and solar testing using two existing test stands; a thermal

receiver test stand and an optical/on sun receiver test stand. Each stand would be modified by replacing the absorber tubes with new absorber tubes coated with the coating developed as part of this project. Testing would be performed both inside and outside. In both cases, the test stands are installed in designated testing areas.

The project would include the use and handling of various bases, acids, and metal salts. All such handling would occur indoors, at supervised laboratory settings. Risks associated with the completion of project activities would be mitigated through adherence to established health and safety policies and procedures. Protocols would include the use of personal protective equipment, personnel training, monitoring and internal assessments. Dartmouth College and Norwich Technologies would observe all applicable Federal, State and local health, safety and environmental regulations.

Nanomaterials would be fabricated as part of this project. The nanoparticles would be obtained from an aqueous suspension, eliminating any inhalation risks during fabrication. Substrate coating, heat treatments, and all other handling of nanomaterials would be performed under fume hoods in order to mitigate inhalation risks. Upon completion of project activities, nanomaterials would be treated as hazardous materials and stored/labelled accordingly. They would be disposed of by a qualified Environmental, Health and Safety specialist.

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, 01/02/2019

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: Electronically Signed By: Kristin Kerwin Date: 1/2/2019

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] 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: _____ Date: _____

Field Office Manager