

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Virginia Polytechnic Institute and State University**STATE:** VA

PROJECT TITLE: Fractal Nanostructured Solar Selective Surfaces for Next Gen Concentrating Solar Power

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-EE0001840	DE-EE0008537	GFO-0008537-001	

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 Virginia Polytechnic Institute and State University (Virginia Tech) to design, develop, fabricate, and test solar selective coatings for use in concentrated solar power (CSP) applications. Coatings would be developed so as to improve their absorptance and eliminate the need for anti-reflection (AR) coatings. Various coating materials would be developed and applied to substrates utilizing a tailored electrodeposition process. Project activities would be completed over two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

Proposed project activities under BP1 would focus on fractal coating fabrication and material characterization. Specific tasks would include the performance of coating experiments via electrodeposition, solar selective surface characterization, and reflectance, emittance and absorptance measurements (e.g. optical characterization, mechanical durability testing). BP2 activities would consist of mechanical durability characterization and techno-economic modeling. Task work would include thermal endurance characterization (e.g. solar simulator testing, isothermal testing, mechanical durability characterization, and thermal cyclic testing) and the development of a technology to market plan.

All project activities would be performed by Virginia Tech at existing, purpose-built laboratory facilities at its campus in Blacksburg, Virginia. No physical modifications to existing facilities, ground disturbing activities, outdoor deployments, or changes in the use, mission, or operation of existing facilities would be required for completion of project activities. Likewise, no additional permits or authorizations would be required.

Project activities would involve the use and handling of various metals, ceramics, solvents, and acids in low quantities. Machines operating at high temperatures and pressures would also be operated. All such handling would occur in controlled laboratory environments. Virginia Tech would adhere to established university health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, engineering controls, monitoring, and internal assessments. The disposal of any hazardous waste material would be

overseen by Virginia Tech's Environmental Health and Safety Office. Virginia Tech would comply with all relevant Federal, state, and local health, safety, and environmental regulations.

Nanoparticles would also be used and handled during laboratory research. Specifically, electrodeposition would involve embedding black nickel nanoparticles and nanochains onto substrates. Virginia Tech's Environmental Health and Safety Office has established guidelines for the handling of nanoparticles. These guidelines have specific protocols and engineering controls in place to mitigate against inhalation, ingestion, or exposure to nanoparticles. These guidelines would be adhered to when using, handling, storing, or disposing of any materials containing nanoparticles. Additionally, all projects involving nanomaterials research are registered in Virginia Tech's Safety Management System and would be monitored and controlled accordingly.

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, 06/27/2019

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: _____


NEPA Compliance Officer

Date: 6/27/2019

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: _____

Date: _____

Field Office Manager