

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Iowa State University of Science and Technology**STATE:** IA

PROJECT TITLE: Novel ceramic capacitors with ultrahigh energy density and efficiency

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001980	DE-EE0009105	GFO-0009105-001	

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 Iowa State University of Science and Technology (ISU) to develop methodologies for rapid screening of anti-ferroelectric (AFE) ceramic compounds for use as dielectric insulators in capacitors. AFE's have the potential to increase the energy efficiency of energy storage applications. Rapid screening of AFE's would enable accelerated material design of the compounds, to in turn, improve the material characteristics of AFE's. As part of the project, ISU would synthesis AFE powders and apply high-throughput screening (HTS) and machine learning techniques to screen potential compounds and down-select materials with the targeted characteristics of interest (e.g. near zero hysteresis, high charge/discharge efficiency, and improved cyclability). Laboratory-scale AFE capacitors (10mm diameter x 0.5mm height) would be fabricated from the materials and used for physical characterization and performance testing.

Project work would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. This NEPA review is applicable to all project activities performed throughout the three BPs. Proposed project activities would include data analysis, forecasting, algorithm development, HTS process development, AFE powder synthesis, material characterization, capacitor fabrication, and performance testing of materials. Approximately 200 capacitors would be fabricated and tested over the course of the project.

All project activities would be coordinated by ISU and performed at existing, purpose-built facilities. ISU would perform data analysis, material characterization, fabrication and performance testing at its campus in Ames, IA. Project partner New York University (NYU) would assist with algorithm/machine learning development, performing computer-based task work at its campus in New York City, NY. Additional laboratory characterization/experimentation may be performed at the facilities of Ames Laboratory (Ames Laboratory) on a fee-for-service basis. However, Ames Laboratory would not serve as a sub-contractor or project partner.

Small-scale laboratory equipment would be installed at ISU's facilities for high-throughput oxide powder synthesis. Four primary pieces of equipment would be installed or integrated with existing systems. This equipment would solely require connection to existing electrical outlets. No modifications to existing facilities, ground disturbing activities, or changes to the use, mission, or operation of existing facilities would be required. No additional permits, licenses, or authorizations would be required.

Project work conducted by ISU would involve the use and handling of hazardous materials, including industrial chemicals and lead oxides. All such handling would be performed in controlled, laboratory environments. ISU would mitigate potential risks through adherence to established university health and safety policies and procedures. Protocols would include personnel training, the use of personal protective equipment, engineering controls, monitoring, and internal assessments. Project work performed by NYU would be limited to office-based analysis and computer programming. Accordingly, no significant health risks are anticipated for work performed by NYU.

Project work at ISU would involve the use and handling of nanoparticles. Nanoparticles from non-toxic chemicals would be used. These would be used in amounts smaller than 100 mg. All researchers handling these materials would undergo specialized training for the safe handling of nanoparticles. Personnel would adhere to established university health and safety policies and procedures concerning the handling and disposal of these materials.

Both ISU and NYU would observe all applicable Federal, state, and local health, safety, and environmental regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Advanced Manufacturing Office

This NEPA determination does not require a tailored NEPA Provision.

NEPA review completed by Jonathan Hartman, 05/05/2020

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: _____



Casey Strickland

NEPA Compliance Officer

Date: 5/7/2020

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: _____