PMC-ND
(1.08.09.13)

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

RECIPIENT: Vanderbilt University **STATE:** TN

PROJECT TITLE: Fuel Cell Membrane-Electrode-Assemblies with PGM-free Nanofiber Cathodes

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001874	DE-EE0008418	GFO-0008418-001	GO8418

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 Vanderbilt University (Vanderbilt) to design, fabricate, characterize, and evaluate nanofiber mat cathodes for incorporation into membrane electrode assemblies (MEAs), for the purpose of improving the current power and durability capabilities of traditional cathodes. The cathodes would be fabricated by electro-spinning catalyst powders with a proton conducting binder. The project would be divided into two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

Proposed project activities under BP1 would include baseline catalyst delivery and evaluation, generational optimization of catalysts, fabrication of electro-spun nanofiber electrodes, incorporation of electrodes into MEAs with Gen-0 and Gen-1 catalyst powder, and MEA performance testing (e.g. accelerated stress tests). BP2 activities would consist of catalyst surface property optimization, active sites optimization, fabrication of electro-spun MEAs with Gen-2 and Gen-3 catalyst powder, electrode fabrication, and characterization/testing of electro-spun MEAs.

All project activities would be completed by Vanderbilt (Nashville, TN), and its project partners, Pajarito Powder, LLC (Albuquerque, NM), and eSpin Technologies, Inc. (Chattanooga, TN) at existing, purpose-built facilities that regularly perform work similar in nature to that proposed as part of this project. Additional testing and characterization would also be performed at the facilities of other national laboratories that form part of the Department of Energy's Energy Materials Network consortia. No physical modifications to existing facilities, ground disturbing activities, or any

changes to the use, mission or operations of existing facilities would be required as part of this project. No additional permits, licenses or authorizations would need to be obtained.

The project would involve the use and handling of catalyst powders, polymers, industrial solvents, and hydrogen gas. All such handling would occur indoors in laboratory environments. Risks associated with the handling of project materials 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 engineering controls. Hazardous materials would be labeled and stored appropriately. Qualified personnel would dispose of any hazardous materials, following established safety protocols. Vanderbilt and all of its project partners would observe all Federal, state, and local health, safety, and environmental laws and regulations.

Nanoscale materials would be synthesized at Pajarito Powder's facilities and would include iron, nickel, cobalt and carbon nanoparticles. Some of these materials are pyrophoric in nature. A passivation method, developed specifically to prevent self-ignition, would be implemented when working with these materials. Catalyst powders would be prepared with particle sizes generally in the 200-600 nanometer (nm) range, though some powders may have an average particle size under 200 nm. Laboratory procedures would be implemented to mitigate against inhalation risk, including the use of fume hoods when handling nanoparticles.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Fuel Cell Technologies Office
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Jonathan Hartman, 01/09/2019

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.
DOE has determined that work to be carried out outside of the United States, its territories and possessions is exempt from further review pursuant to Section 5.1.1 of the DOE Final Guidelines for Implementation of Executive Order 12114; "Environmental Effects Abroad of Major Federal Actions."
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: Casey Strickland Date: 1/9/2019

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