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(1.08.09.13)

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

RECIPIENT: Forge Nano Inc. **STATE:** CO

PROJECT TITLE: Reducing the Cost and Energy of Lithium-ion Battery Manufacturing using High Throughput Atomic Layer Deposition Processes

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001980	DE-EE0009113	GFO-0009113-001	

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 Forge Nano to fabricate and test a novel atomic layer deposition (ALD)-enabled separator for use in lithium ion battery applications. Forge Nano would develop a roll-to-roll (R2R) manufacturing process for the production of separator cell coatings. An R2R tool would then be installed at Forge Nano's facilities and used for separator coating testing.

The project 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 work activities in all three BPs. During BP1, an R2R tool would be procured and installation planning would be performed. New coatings would be developed and characterized. Separators would then be synthesized, coated, and tested. Coating would be performed using an existing batch-scale ALD system. The best performing coatings would be down selected for further testing. BP2 activities would consist of R2R tool installation, separator synthesis, and coating using the R2R ALD system. Performance testing would be performed on the coated separators. An initial technoeconomic analysis (TEA) would also be performed. BP3 activities would include battery fabrication, performance testing of separators and battery cells, demonstration of the R2R ALD coating system in-line with an existing commercial cell stacker, and completion of the TEA.

All project activities would be coordinated by Forge Nano and performed at existing, purpose-built locations. Forge Nano would perform thin film deposition, battery fabrication, and battery testing at its manufacturing/laboratory facilities in Louisville, CO and in Thornton, CO. Forge Nano is currently in the process of transitioning to its new facility location in Thornton, CO. The R2R tool would be installed at the Thornton location (discussed below). Project partner Oak Ridge National Laboratory (ORNL) would assist with battery fabrication and testing at its laboratory facilities in Oak Ridge, TN.

Small-scale modifications would be made to Forge Nano's Thornton facility in order to accommodate the installation of the R2R tool. These would include routing inert gas lines, moving power outlets, and installing exhaust ducting. A point-of-use electrical panel with breaker would also be installed in order to isolate the tool. Forge Nano regularly

installs ALD equipment. The modifications required for the R2R tool would be similar to those performed for ALD equipment installations. No 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 would involve the use and handling of hazardous materials including compounds containing heavy metals in powder form, hazardous precursors, and industrial chemicals/solvents. Additionally, high-powered equipment and machinery would be utilized, operating at high pressures. All such handling would occur in controlled laboratory environments. In order to mitigate against potential risks associated with the completion of project activities, established health and safety policies and procedures would be adhered to. Protocols would include employee training, the use of personal protective equipment (PPE), engineering controls, monitoring, and internal assessments.

Hazardous waste materials would also be generated, including lithium ion batteries, powders containing heavy metals, and aqueous acids/bases. Forge Nano and ORNL would discharge batteries prior to disposal. All hazardous waste materials would be disposed of by a certified third-party waste handler. Forge Nano and ORNL would observe all applicable Federal, state, and local health, safety, and environmental regulations.

Covalently bonded nanometer-scale ceramic coatings would be used and handled throughout the project. However, these would not include loose nanoparticles and accordingly, respiratory hazards would not be present. Regardless, all personnel would be trained appropriately in the handling of nanoparticles. Appropriate PPE and ventilation would also be used at all times.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

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, 05/07/2020

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: Electronically Signed By: Casey Strickland Date: 5/7/2020

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