

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



RECIPIENT: Arizona State University

STATE: AZ

PROJECT TITLE: Inverse Design of Perovskite Materials for Solar Thermochemical Water Splitting

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002792	DE-EE0010732	GFO-0010732-001	GO10732

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 Arizona State University (ASU) to develop high performance perovskite material composition and a complementary reactor design capable of producing hydrogen through a solar thermochemical reaction. Specifically, the award aims to use techno-economic analysis (TEA) to predict material thermodynamic and cost characteristics, identify at least one perovskite composition with the essential thermodynamic and cost characteristics, and optimize reactor configuration and performance to realize the solar-to-hydrogen conversion capabilities of the material.

Award activities would involve thermodynamic and production plant level modeling; TEA; computational materials analysis; reactor modeling, design, and on-sun testing; and materials characterization and stability testing. All activities would occur in laboratory settings.

ASU (Tempe, AZ) would utilize existing laboratory space for proposed computational materials design and analysis, thermochemical materials testing, and TEA activities. The University of Michigan (Ann Arbor, MI) would be responsible for multiphysics modeling of the reactor and testing of flow patterns. Solar thermochemical water splitting experiments and cyclability testing would occur at Valparaiso University's (Valparaiso) solar energy laboratory in Valparaiso, IN. All facilities are preexisting purpose-built facilities for the type of work to be conducted for this award. Facility modifications would not be required. Additionally, collaboration is expected to occur with the HydroGEN Energy Materials Network National Laboratory consortium.

Award activities would involve typical hazards associated with the handling and use of hazardous materials, including metal oxides and solvents which would occur in a laboratory setting. All hazardous materials would be managed in accordance with federal, state, local environmental regulations. Hazards associated with high flux solar experiments are also proposed and would be conducted within a dedicated facility at Valparaiso. Valparaiso has existing laboratory safety protocols which includes waste disposal protocols and protocols for the high flux solar furnace. Existing health, safety, and environmental policies and procedures would be followed to mitigate hazards to acceptable levels, including required chemical, gas, and fire trainings. Mitigated hazards would pose negligible risks to the public and environment. All activities would comply with existing federal, state, and local laws and regulations.

DOE has considered the scale, duration, and nature of proposed activities to determine potential impacts on resources, including those of an ecological, historical, cultural, and socioeconomic nature. DOE does not anticipate

impacts on these resources which would be considered significant or require DOE to consult with other agencies or stakeholders. A diversity, equity, and inclusion (DEI) plan would be implemented to encourage the inclusion of individuals from underrepresented groups in fields of science, technology, engineering, and mathematics (STEM).

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:

Hydrogen and Fuel Cell Technologies Office
NEPA review completed by Corrin MacLuckie, 08/14/2023.

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

NEPA Compliance Officer

Date: 8/14/2023

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: _____