



U.S. Department of Energy Categorical Exclusion Determination Form

Submit by E-mail

Proposed Action Title: California Institute of Technology - Acceleration of Catalytic Reactions by Non-Conventional Means: First Principles-Based Prediction of Enhancement by Acoustic Waves

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Pasadena, CA

Proposed Action Description:

Funding will support the project team's small-scale research and development activities to develop a refined tool to facilitate broader use of acoustic waves (AWs) in catalyzed reactions. Specifically, the project team will (1) experimentally validate/reproduce ethanol decomposition and oxidation reactions using AWs; (2) characterize catalytic surfaces to gain insight into the mechanism of acceleration facilitated by AWs; (3) conduct simulations to predict the fundamental mechanisms underlying the effects of surface AWs; and (4) conduct experiments on ammonia synthesis with and without acoustic waves. If successful, AW-enhanced catalytic processes could lead to enhanced selectivity for producing valuable chemicals and fuels with considerably reduced energy costs and reduced waste products.

Project activities will be conducted at an existing facility, California Institute of Technology (Pasadena, CA), designed for the applicable activities. Project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and local regulatory requirements. No modifications will be made to the existing facility to accommodate the proposed work.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

The proposal 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.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer:

Date Determined: December 9, 2016



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Proposed Action Description:

Caltech proposes to conduct information gathering and analysis activities to explore the development of a refined tool for broader uses of acoustic waves (AWs) in catalysis. Specifically, Caltech will use first-principles theory and computation to deduce underlying mechanisms for AW-enhanced catalysis, and then extend this work to suggest promising applications. The focus of Caltech's studies will be on CO oxidation, ethanol oxidation, and ethanol decomposition reactions on palladium and platinum.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

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NEPA Compliance Officer:

Date Determined: 02/25/2015