



U.S. Department of Energy Categorical Exclusion Determination Form

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Proposed Action Title: University of California, Irvine (UCI) - Thermocomfort Cloth Inspired by Squid Skin

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): Irvine, CA and Baltimore, MD

Proposed Action Description:

UCI, in conjunction with Under Armour, Inc. (UA), proposes to develop a dynamically tunable, thermoregulatory fabric which utilizes a biomimetic reconfigurable infrared device to maintain skin temperature at a constant and comfortable level in cooler external environments.

UCI will conduct small-scale research and development activities involving generation of recombinant DNA and synthetic biological materials in an enclosed, dedicated laboratory facility that will be performed by UCI in accordance with the NIH Guidelines for Research Involving Recombinant DNA Molecules. All organisms that will be used in the proposed project are non-pathogenic, and genes that will be cloned are from non-pathogenic microorganisms. UA's participation in the proposed project will be limited exclusively to assembly of fabric using standard commercial techniques which comply with applicable federal, state, and local requirements. Project activities will take place at UCI's Biosafety Level 1 laboratory facility in Irvine, CA and UA's industrial manufacturing facilities in Baltimore, MD.

Categorical Exclusion(s) Applied:

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

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: 03/23/2015


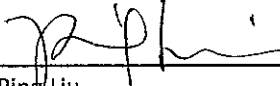


**PROJECT ENVIRONMENTAL REVIEW
MEMORANDUM TO THE RECORD**

Lead Organization: University of California, Irvine

Project Title: Thermocomfort Cloth Inspired by Squid
Skin

Date: March 23, 2015

Approved:	 William J. Bierbower ARPA-E NEPA Compliance Officer
Concurred:	 Dr. Ping Liu ARPA-E Program Director

INSTRUCTIONS: Please complete Sections I - V of this memorandum form. Please complete all relevant fields. Where a particular field is irrelevant to the project under review, please indicate "N/A" in the field.

SECTION I. PROJECT INFORMATION

Funding Opportunity Announcement (if any): DE-FOA-0001127: Delivering Efficient Local Thermal Amenities (DELTA)

Lead Organization: University of California, Irvine (UCI)

Other Participants (Subrecipients, Contractors, etc.): Under Armour, Inc. (UA)

Locations of Work (City, State): Irvine, CA and Baltimore, MD

SECTION II. NEPA ANALYSIS

A. CATEGORICAL EXCLUSION(S) APPLIED

The activities to be conducted under this project fit within the class(es) of actions listed in Categorical Exclusion(s) B3.6 (Small-scale research and development, laboratory operations, and pilot projects). Categorical Exclusion(s) cover(s):

B3.6: Siting, construction, modification, operation, and decommissioning of facilities for small-scale 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.

The proposed activities satisfy the elements and requirements of Categorical Exclusion(s).

UCI, in conjunction with UA, proposes to develop a dynamically tunable, thermoregulatory fabric for garments which utilizes a biomimetic reconfigurable infrared device to maintain skin temperature at a constant and comfortable level in cooler external environments. Specifically, the Project Team will: (1) evaluate and select infrared reflecting and dielectric elastomer materials; (2) develop, characterize, and fabricate an optimized dielectric elastomer composite device; (3) evaluate and test dynamic thermoregulation of the dielectric elastomer composite device; and (4) manufacture and test a fabric which integrates the selected infrared reflecting material with the developed dielectric elastomer composite device to demonstrate proof of concept.

No modifications will be made to existing facilities to accommodate the proposed work.

B. EXTRAORDINARY CIRCUMSTANCES ANALYSIS (All Categorical Exclusions)

The proposed project will involve the following:

- a. Use, handling, storage, transport, or disposal of radioactive, toxic, or hazardous chemicals or materials

Yes No

- b. Use, handling, storage, transport, or disposal of genetically engineered organisms recombinant DNA.

Yes No

c. Use, handling, storage, transport, or disposal of nanoscale materials

Yes No

d. Use, handling, storage, transport, or disposal of solid wastes

Yes No

e. Emissions into the ambient air

Yes No

f. Release of pollutants/contaminants into water resources

Yes No

g. Substantial noise pollution

Yes No

h. Adverse community-based environmental impacts

Yes No

Comments: UA's participation in the proposed project will be limited exclusively to assembly of fabric using traditional cut and sew/heat sealing techniques that will be carried out at UA's industrial manufacturing facility. UA will adhere to its corporate safety protocols to carry out all project activities.

Project activities carried out by UCI will include generation, use, storage, and disposal of small quantities of hazardous materials, such as organic solvents that are used in routine laboratory practices, and nanoscale materials composed of reflectin, metals, oxides, and ceramics which are <50 microns in size. All project work will take place in dedicated laboratory facilities designed for such activities and performed by trained laboratory personnel. Hazardous and nanoscale materials will be generated, used, and stored in accordance with the University's Chemical Hygiene Plan. The University EH&S Department will dispose of all hazardous and nanoscale materials in accordance with all federal, state, and local requirements.

Project activities carried out by UCI will include generation, use, handling, storage, transport, and disposal of small quantities of recombinant *E. Coli* DNA. All project activities involving recombinant DNA will occur in a dedicated laboratory facility that meets or exceeds Center for Disease Control Biosafety Level 1 requirements, which is suitable for well-characterized, non-pathogenic agents not known to consistently cause disease in healthy adult humans, and are of minimal potential hazard to laboratory personnel. All organisms to be used in the proposed project are non-pathogenic, and genes to be cloned are from non-pathogenic microorganisms. Recombinant DNA will be handled, labeled, and disposed of in accordance with the UCI Institutional Biosafety Committee and NIH Guidelines for Research Involving Recombinant DNA Molecules.

Typical non-hazardous laboratory and office solid wastes (e.g., gloves, paper, scrap fabric) may be generated over the course of the project by both UCI and UA, and will be disposed of in accordance with applicable federal, state, and local requirements. Project work is not expected to generate

emissions (nanoscale materials will be stored by UCI as powders or in liquid suspensions to prevent release into the ambient air).

C. INTEGRAL ELEMENTS ANALYSIS (Appendix B Categorical Exclusions Only)

The proposed project will:

- a. Threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health or similar requirements of DOE or Executive Orders.

Yes No

- b. Require siting/construction or major expansion of waste storage, disposal, recovery, or treatment facilities.

Yes No

- c. Disturb hazardous substances, pollutants, contaminants, or petroleum/natural gas products that preexisted in the environment, resulting in an uncontrolled/unpermitted release.

Yes No

- d. Have potential to cause significant impacts on environmentally sensitive resources.

Yes No

- e. For projects involving genetically engineered (GE) organisms, synthetic biology, governmentally designated noxious weeds, or invasive species:

- i. Such organisms will be contained and confined in a manner designed and operated to prevent unauthorized release into the environment.

N/A Yes No

- ii. Activities involving recombinant DNA will be conducted in accordance with NIH Guidelines for Research Involving Recombinant DNA Molecules

N/A Yes No

- iii. Activities involving GE organisms with pesticidal qualities will be conducted in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. § 136 et seq.) and EPA's FIFRA Implementing Regulations (40 C.F.R. Parts 150-189).

N/A Yes No

- iv. Activities involving GE organisms that may pose a risk to plant/animal health will be conducted in accordance with the APHIS Regulations (7 C.F.R. Part 340).

N/A Yes No

- v. Activities involving new GE organisms will be conducted in accordance with the Toxic Substances Control Act (TSCA) (15 U.S.C. § 2601 et seq.) and EPA's TSCA Implementing Regulations (7 C.F.R. Parts 700-790).

N/A Yes No

Comments: Small-scale research and development activities involving generation of recombinant DNA and synthetic biological materials will take place in enclosed, dedicated laboratory facilities that are equipped and designed for the safe use, handling, storage, transport, and disposal of GE organisms and materials, with measures to prevent unauthorized releases into the environment. The proposed activities include expression of reflectin in standard E.Coli systems following standard commercial processes, and thus, does not involve organisms with pesticidal qualities, organisms that pose a risk to plant/animal health, or generation of new genetically engineered organisms. All organisms that will be used in the proposed project are non-pathogenic, and genes that will be cloned are from non-pathogenic microorganisms. All modifications will, in general, reduce organism viability outside of laboratory conditions.

SECTION III. ADDITIONAL COMMENTS/ANALYSIS

The proposed action consists of small scale research and development activities involving generation of recombinant DNA and synthetic biological materials to be performed in an existing laboratory facility at UCI which is equipped and designed for such activities. The proposed action fits squarely within Categorical Exclusion B3.6, presents no extraordinary circumstances, and satisfies the integral elements for projects categorically excluded under Appendix B of 10 C.F.R. Part 1040.

SECTION IV. RECOMMENDATION FOR CONDITION ON AWARD

- It is recommended that the following condition be included in the award:

Funding under this award may be used for activities involving genetically engineered organisms and recombinant DNA molecules only if such activities are conducted in accordance with the NIH Guidelines for Research Involving Recombinant DNA Molecules.

- No NEPA-related condition need be included in the award.

SECTION V. RECOMMENDATION FOR CATEGORICAL EXCLUSION

The activities to be conducted under this project fit within the class of activities identified under the Department of Energy Categorical Exclusion(s) identified above.

The review has not identified any extraordinary circumstances related to the specific project that may affect the significance of the environmental effects of the project.

It is recommended that no further review under NEPA is required; however, any changes to the project may require further review.

Please find attached the selectee's completed and signed NEPA Questionnaire.

Schmidt, Heather (CONTR)

From: Liu, Ping
Sent: Tuesday, March 24, 2015 10:32 AM
To: Schmidt, Heather (CONTR)
Cc: Ross, Russel (CONTR)
Subject: Re: For your approval: UCI NEPA Determination form

I concur, Ping

On 3/24/15 9:26 AM, "Schmidt, Heather (CONTR)"
<Heather.Schmidt@Hq.Doe.Gov> wrote:

>Hi Ping,
>
>Legal has finalized the NEPA for UCI. Attached is the scanned copy for
>your review and electronic concurrence. I can have you sign the hard copy
>once you return to the office.
>
>Thanks,
>Heather