

Statement of Interest

W912HZ-14-SOI-0016

Project to be initiated in 2014

Project Title: Evaluating Molecular Mechanisms for Producing Biopiezoelectricity

Responses to this Request for Statements of Interest will be used to identify potential investigators for a project to be funded by the U.S Army Corps of Engineers (USACE) Engineer and Research and Development Center, Environmental Laboratory (ERDC/EL) in Vicksburg, MS. Approximately \$15K is expected to be available to support this project for the base year and up to \$60K additional funds per year for three (3) option years. This would provide potential funding of \$195K (based on funding availability) over the anticipated 4-yr project life.

Background:

Biopiezoelectricity, or the process of converting mechanical into electrical energy in biological materials, can potentially provide low grade power to autonomous sensors and devices. In order to evaluate these types of energy converting devices, the molecular mechanism of biopiezoelectricity must be better understood .

Potential applications may include multifunctional materials that respond to physical stress, mechano-electrical switches, and small self-powered systems that capture energy from movement. Anticipated benefits from this type of energy production would include positive impacts on environmental systems, human health, and agricultural applications.

Brief Description of Research:

To test this hypothesis, the awardee will evaluate phage-based piezoelectric devices with varied structural and chemical properties as well as explore organic/inorganic composites to investigate the relationship of phage charge density and symmetry to biopiezoelectricity.

Objectives:

- Develop/Evaluate methods for piezoelectric force microscopy analysis on bio-laminates to characterize both qualitative and quantitative vertical and lateral piezoelectric coefficients of fabricated phage biofilms.
- Develop/Test controls for calibration of piezoelectric force microscopy on bio-laminates
- Evaluate fabrication techniques for micro-devices driven by micro-harvested biopiezoelectrical power

Requirements:

Successful applicants should have expert knowledge of bacteriophage production, bacteriophage film and device fabrication, and piezoelectric characterization and analysis. Candidates will be required to submit annual reports and a final report on study results.

Government Furnished Property and Services:

The Government will work cooperatively with the awardee to identify issues related to protocol and method development. The Government will assist in analyzing potential methods and materials necessary to evaluate this technology. The Government will participate in disseminating results from this study to the greater scientific community.

Materials Requested for Statement of Interest/Qualifications:

Please provide the following via e-mail to:

Deberay.R.Carmichael@usace.army.mil (maximum length 2 pages, single spaced 12 pt. font)

- 1) Name, Organization and Contact Information
- 2) Brief Statement of Qualifications including:
 - a. Biographical Sketch
 - b. Relevant past projects and clients with brief description of project
 - c. Staff, faculty and students available including area of expertise
 - d. Brief description of capabilities to successfully complete this project

Note: a proposed budget is NOT requested at this time.

Review of Statements Received: Based on a review of the Statements of Interest received, an investigator or investigators will be invited to prepare a full study proposal. Statements will be evaluated based on investigators specific experience and capabilities in areas related to the study requirements. Additionally, the evaluation method and selection criteria for research and development awards must be: 1) The technical merits of the proposed research and development; and 2) Potential relationship of the proposed research and development to the Department of Defense missions.

Please send responses or direct questions to:

Deberay Carmichael

U.S. Army Engineer Research and Development Center (ERDC)

ERDC Contracting Office (ECO)

3909 Halls Ferry Rd.

Vicksburg, MS 39180

Deberay.R.Carmichael@usace.army.mil

Timeline for Review of Statements of Interest: Review of Statements of Interest will begin after the SOI has been posted on the CESU website for 10 working days.