

**Request for Statements of Interest
Funding Opportunity Announcement**

Federal Awarding Agency:

U.S. Army Corps of Engineers,
Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Funding Opportunity No: W81EWF-22-SOI-0036

CFDA No: 12.630

Statutory Authority: 10 USC 4001

Program Title: "Developing Biotechnologies for Detection and Recovery of Rare Earth Elements"

Announcement Type: Initial announcement

Issue Date: 01 July 2022

Statement of Interest/Qualifications Due Date: 01 August 2022; 1300 central time

Full Application Package Due Date, if Invited: 19 August 2022; 1300 central time

Estimated Award Ceiling: \$350,000.

Estimated Total Program Funding (optional); \$350,000

Expected Number of Awards: The government will issue only 1 award from this announcement.

Section I: Funding Opportunity Description

Background: Rare earth elements (REE) are critical components of many advanced technologies including magnets in hard drives and components of lasers. Of the 17 rare earth elements, 16 (cerium, dysprosium, erbium, europium, gadolinium, holmium, lanthanum, lutetium, neodymium, praseodymium, samarium, scandium, terbium, thulium, ytterbium and yttrium) are designated critical minerals and are present in different combinations and concentrations depending on the primary (e.g. ores, red mud, geological deposits) and secondary (e-waste, coal ash and landfill leachate) sources of the critical minerals. Of these 16, all except for cerium and lanthanum, are in undersupply. Individual REE are used in different combinations to develop advanced technologies necessitating the isolation of elements from primary and secondary sources and the purification of defined REE mixtures or individual elements. However current approaches are energy and solvent intensive and do not easily separate the different REE from each other. Biotechnology applications such as bioleaching and biosorption are promising approaches for REE recovery but require further research and development to increase selectivity, efficiency, cost effectiveness and scalability.

Brief Description of Anticipated Work:

Required Work Objectives: This project will develop novel microbes with increased capability to dissolve and capture REE from solid sources such as crushed ore and e-waste. The project will also examine approaches to increase the selectivity and affinity of biomolecules for different REE. Additionally, the project will investigate different technologies/approaches that improve scalability of REE recovery processes (e.g. concentration and monitoring of REEs during processing). The ultimate goal of this effort is to develop methods that accelerate our ability to recover individual or discrete mixtures of REE from domestic primary and secondary sources.

Objective 1: Increase the selectivity and affinity of biomolecules for different REE. Create semi-synthetic platforms for specific lanthanide-binding, with the reliance on modification of proteins and spores using designed chemical structures for chelation moieties. These platforms should improve the concentration of lanthanides by spores and proteins, while providing methods for tuning protein/spore affinity and selectivity. The specificities of both the semi-synthetic and protein-alone chelators should be further modified using computational models to design peptides and proteins with a variety of affinities and specificities for REE.

Objective 2: Technologies/approaches that improve scalability of REE recovery processes. Surfaces of fluorescent proteins should be modified to create protein biosensors that can bind lanthanides with high affinity and selectivity, and also allow FRET detection both *in vitro* and *in vivo* of lanthanides (samarium, europium, terbium, and dysprosium). Such biosensors will serve as tools for monitoring the efficiencies of processing streams and of the efficacies of different technologies. The successful offeror work with ERDC researchers to examine novel approaches to condense process streams to increase efficiency of downstream processing events.

Results from these objectives will be communicated to ERDC regularly in interim reports and transferred to the Public using conference presentations and the peer-reviewed literature. All methods and protocols will accompany the results and meet peer-review scrutiny for any interim reports.

A successful application would likely include experience with genetic engineering of spores, molecular evolution and synthetic biology, and successful publication record of these methods.

Public Benefit: Development of approaches to harvest critical minerals from domestic sources is essential to establishing secure domestic supply chains for REE. Furthermore, the environmentally friendly

biotechnologies developed here will greatly lower adverse environmental and climate effects caused by existing REE mining approaches. Further, understanding how to selectively isolate REE from many sources will greatly increase our ability to isolate other critical minerals. This project will benefit the public by providing new approaches to harvest critical minerals, by educating the public about environmentally friendly approaches for mining/recycling, and by increasing availability of critical materials for development of advanced technology.

Section II: Award Information

Responses to this Request for Statements of Interest will be used to identify potential investigators for studies to be sponsored by the Engineer Research and Development Center for Developing biotechnologies for detection and recovery of Rare Earth Elements. The estimated level of funding for FY22 is approximately \$350,000.

Government Involvement:

ERDC personnel will provide samples of REE mixtures and primary/secondary source leachates for isolation and detection of light and heavy REE, engineered genes/proteins/microorganisms for high affinity binding of REE and other critical metals and work cooperatively with the investigator to identify issues related to the detection and purification of REE from primary/secondary sources. ERDC personnel will assist in development of REE assays and strategies for selectively binding REE using biomolecules. An ERDC representative will be available for meetings with the investigators. USACE will provide technical review of all products and co-author journal articles and facilitate and participate in coordination and meetings with collaborators as needed to disseminate results from these studies. In addition, the successful Recipient will participate in stakeholder meetings with ERDC researchers.

Section III: Eligibility Information

1. Eligible Applicants – This opportunity is restricted to non-federal partners of the Gulf Coast Cooperative Ecosystems Studies Unit (CESU).
2. Cost Sharing – This action will be 100% funded by USACE.

Section IV: Application and Submission Information – Two Phase Process

Phase I: Submission of a Statement of Interest/Qualifications.

1. Materials Requested for Statement of Interest/Qualifications:
 - a. Please provide the following via e-mail attachment to: stacy.d.thurman@usace.army.mil (Maximum length: 2 pages, single-spaced 12 pt. font).
 1. Name, Organization and Contact Information
 2. Brief Statement of Qualifications (including):
 - Biographical Sketch,
 - Relevant past projects and clients with brief descriptions of these projects,
 - Staff, faculty or students available to work on this project and their areas of expertise,
 - Any brief description of capabilities to successfully complete the project you may wish to add (e.g. equipment, laboratory facilities, greenhouse facilities,

field facilities, etc.).

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

The administrative point of contact is Stacy Thurman; stacy.d.thurman@usace.army.mil

2. Statement of Interest/Qualifications shall be submitted NO LATER THAN 01 August 2022; 1300 central time zone

Based on a review of the Statements of Interest received, an investigator or investigators will be invited to move to Phase II which is to prepare a full study proposal. Statements will be evaluated based on the investigator's specific experience and capabilities in areas related to the study requirements.

Phase II: Submission of a complete application package to include a full technical proposal including budget, if invited.

1. Address to Request Application Package

The complete funding opportunity announcement, application forms, and instructions are available for download at Grants.gov.

The administrative point of contact is Stacy Thurman; stacy.d.thurman@usace.army.mil

2. Content and Form of Application Submission

All mandatory forms and any applicable optional forms must be completed in accordance with the instructions on the forms and the additional instructions below.

- a. SF 424 R&R - Application for Federal Assistance
- b. Full Technical Proposal – Discussion of the nature and scope of the research and technical approach. Additional information on prior work in this area, descriptions of available equipment, data and facilities, and resumes of personnel who will be participating in this effort should also be included.
- c. Cost Proposal/Budget – Clear, concise, and accurate cost proposals reflect the offeror's financial plan for accomplishing the effort contained in the technical proposal. As part of its cost proposal, the offeror shall submit cost element breakdowns in sufficient detail so that a reasonableness determination can be made. The SF 424 Research & Related Budget Form shall be used if the subrecipient uses it. The cost breakdown should include the following, if applicable:
 1. Direct Labor: Direct labor should be detailed by level of effort (i.e. numbers of hours, etc.) of each labor category and the applicable labor rate. The source of labor rates shall be identified and verified. If rates are estimated, please provide the historical based used and clearly identify all escalation applied to derive the proposed rates.
 2. Fringe Benefit Rates: The source of fringe benefit rate shall be identified and verified.
 3. Travel: Travel costs must include a purpose and breakdown per trip to include destination, number of travelers, and duration.
 4. Materials/Equipment: List all material/equipment items by type and kind with associated costs and advise if the costs are based on vendor quotes and/or engineering estimates; provide copies of vendor quotes and/or

catalog pricing data.

5. Subrecipient costs: Submit all subrecipient proposals and analyses. Provide the method of selection used to determine the subrecipient.
6. Tuition: Provide details and verification for any tuition amounts proposed.
7. Indirect Costs: Currently the negotiated indirect rate for awards through the CESU is 17.5%.
8. Any other proposed costs: The source should be identified and verified.

3. Application package shall be submitted NO LATER THAN 19 August 2022; 1300 hours central time zone.

4. Submission Instructions

Applications may be submitted by e-mail or Grants.gov. Choose ONE of the following submission methods:

a. E-mail:

Format all documents to print on Letter (8 ½ x 11”) paper. E-mail proposal to stacy.d.thurman@usace.army.mil

b. Grants.gov: <https://www.grants.gov/>:

Applicants are not required to submit proposals through Grants.gov. However, if applications are submitted via the internet, applicants are responsible for ensuring that their Grants.gov proposal submission is received in its entirety.

All applicants choosing to use Grants.gov to submit proposals must be registered and have an account with Grants.gov. It may take up to three weeks to complete Grants.gov registration. For more information on registration, go to <https://www.grants.gov/web/grants/applicants.html>.

Section V: Application Review Information

1. **Peer or Scientific Review Criteria:** In accordance with DoDGARs 22.315(c), an impartial peer review will be conducted. Subject to funding availability, all proposals will be reviewed using the criteria listed below (technical and cost/price). All proposals will be evaluated under the following two criteria which are of descending importance.

a. **Technical (items i. and ii. are of equal importance):**

- i. Technical merits of proposed R&D.
- ii. Potential relationship of proposed R&D to DoD missions.

- b. **Cost/Price:** Overall realism of the proposed costs will be evaluated.

2. Review and Selection Process

a. **Categories:** Based on the Peer or Scientific Review, proposals will be categorized as Selectable or Not Selectable (see definitions below). The selection of the source for award will be based on the Peer or Scientific Review, as well as importance to agency programs and funding availability.

- i. **Selectable:** Proposals are recommended for acceptance if sufficient funding is

available.

- ii. **Not Selectable:** Even if sufficient funding existed, the proposal should not be funded.

Note: The Government reserves the right to award some, all, or none of proposals. When the Government elects to award only a part of a proposal, the selected part may be categorized as Selectable, though the proposal as a whole may not merit such a categorization.

b. No other criteria will be used.

c. Prior to award of a potentially successful offer, the Grants Officer will make a determination regarding price reasonableness.

Section VI: Award Administration Information

1. Award Notices

Written notice of award will be given in conjunction with issuance of a cooperative agreement signed by a Grants Officer. The cooperative agreement will contain the effective date of the agreement, the period of performance, funding information, and all terms and conditions. The recipient is required to sign and return the document before work under the agreement commences. **Work described in this announcement SHALL NOT begin without prior authorization from a Grants Officer.**

2. Administrative Requirements

The cooperative agreement issued as a result of this announcement is subject to the administrative requirements in 2 CFR Subtitle A; 2 CFR Subtitle B, Ch. XI, Part 1103; and 32 CFR Subchapter C, except Parts 32 and 33.

3. Reporting

See 2 CFR Sections 200.327 for financial reporting requirements, 200.328 for performance reporting requirements, and 200.329 for real property reporting requirements.

Section VII: Agency Contact

Stacy Thurman, Grants Specialist
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