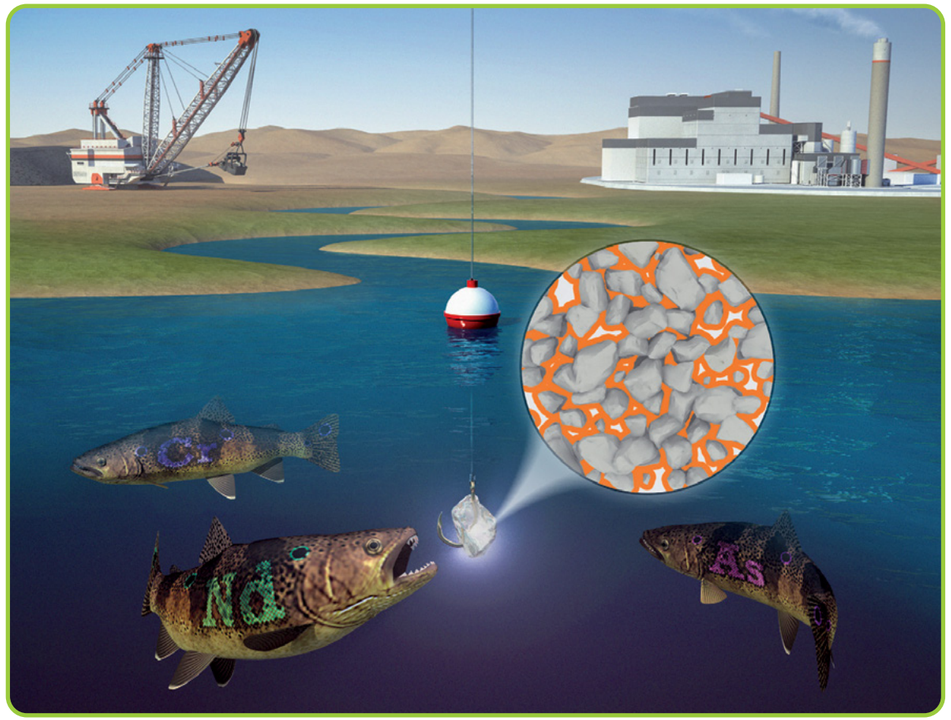
RARE EARTH EXTRACTION FIELD TESTS PROVE VERSATILITY OF NOVEL SORBENT

Unique sorbents recover valuable rare earth elements from acid mine drainage (AMD) waters and heavy metals from flue gas desulfurization (FGD) discharge.

MULTIPLE PROCESSES BENEFIT FROM BASIC IMMOBILIZED AMINE SORBENT (BIAS) DEVELOPMENT

Rare earth elements (REE) and heavy metals are selectively recovered utilizing a highly adaptable sorbent that is also designed to efficiently capture CO_2. Successful demonstration of cyclic adsorption and desorption of ~90% REE from a synthetic AMD solution, and >90% successful removal of lead from spiked tap water further prove the efficacy of this sorbent for commercial applications. These critical advancements in BIAS technology represent exciting progress towards the realization of a commercial-scale, efficient REE extraction or CO_2 capture process.



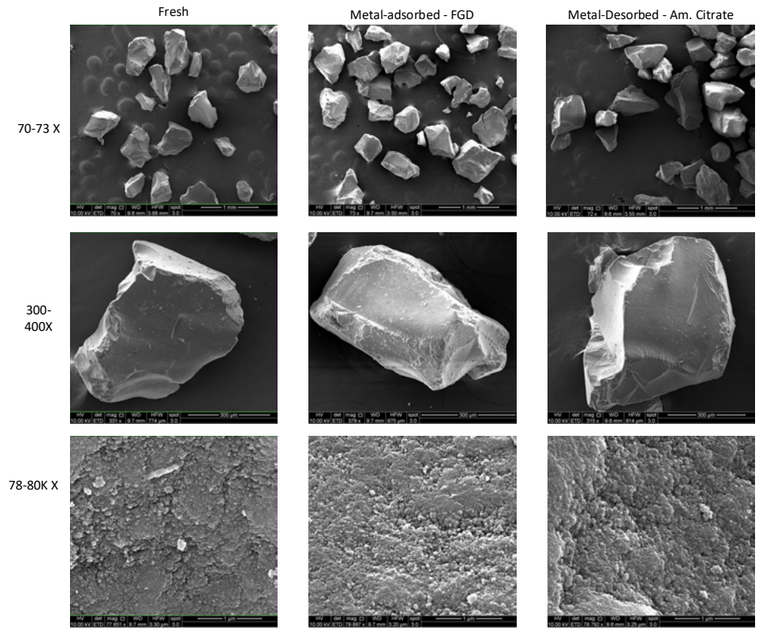
Novel sorbents can selectively remove heavy metals and rare earth elements from industrial wastewater, improving environmental sustainability and economics

PITTSBURGH BOTANIC GARDEN FIELD TEST ACHIEVES SUCCESSFUL EXTRACTION AND ENRICHMENT OF REE FROM ACID MINE DRAINAGE

Solid sorbent from a field test conducted at the Pittsburgh Botanic Garden achieved REE concentration enrichments in the evaporated, eluted effluent at 400 to 8,000 times the concentration of the authentic AMD. With ~100% of the bound REE released from the sorbent, the results indicate reusability and commercial viability of the sorbent for REE extractions.

UNIQUE DESIGN ENHANCES SORBENT STABILITY

The BIAS sorbents utilize robust amine–epoxide cross-linkages and are designed to be H_2O-stable materials. Advanced technical characterization work with a Scanning Electron Microscope reveals no appreciable change in the sorbent's structure upon adsorbing metals from real FGD discharge. Stable flow-through sorbent properties during cycling ensures smooth process performance and reduces potential for column plugging.



Images of sorbents before and after metal adsorption from FGD discharge and after metal desorption provide evidence of sorbent stability

PRINCIPAL INVESTIGATOR HONORED, PATENTS ISSUED, AND TECHNOLOGY LICENSED

In Fiscal Year 2020, McMahan Gray received a Distinguished Alumni Award from the University of Pittsburgh's Chemistry Department for his contributions to chemistry and sorbents. Unprecedented sorbent results have led to a second patent being issued on the BIAS pelletization process for CO_2 capture applications in 2020. The patent "Stable immobilized Amine Sorbents for REE and Heavy Metal Recovery from Liquid Sources" is pending and currently licensed by PQ Inc.

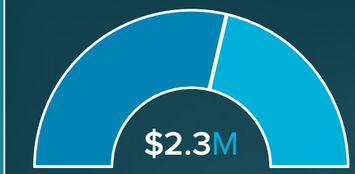
AWARD NUMBER

FWP-1022420

TASK 3

PROJECT BUDGET

FY20 FUNDING



TASK 3 ..... $983,000

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CORE COMPETENCIES

- MATERIALS ENGINEERING and MANUFACTURING
- PROGRAM EXECUTION and INTEGRATION

CLICK HERE FOR MORE INFORMATION