NSF's Convergence Accelerator

NSF Convergence Accelerator's 2022 Cohort Phase 1 Award

Project Title
Sustainable Recycling and Remanufacturing of Clean Energy Products from Electronic Waste

Awardee
Ames National Laboratory (Iowa State University)

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R&D

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NSF Funded Program
NSF's Convergence Accelerator

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PROJECT ABSTRACT
The successful deployment of a resilient rare earth technology largely depends upon the niche it occupies in relation to other parts of the supply chain and how the technologies in the ecosystem are mutually beneficial. The lack of domestic access to critical aspects of the rare earth supply chain leads to excessive dependence on foreign nations for material termed "the vitamin of a modern society". It also threatens the drive towards net zero carbon emission. In response to this challenge, the team led by Ames National Laboratory seeks to converge resilient technologies for domestic rare earth production, capable of surviving a globally competitive marketplace. The team will accelerate early-stage research products for the sustainable valorization of rare earth elements from e-waste and enable domestic production of high-performance permanent magnets.

To ensure successful execution of the proposed work, the team will converge fundamental separation sciences, early stage applied recycling technology, and functional materials manufacturing processes to recover value from the critical materials in e-waste. The team will incorporate technoeconomic and lifecycle analysis to help ensure that developed solutions can be deployed profitably and sustainably in line with the national and global decarbonization efforts.

The National Science Foundation's Convergence Accelerator program will enable a use-inspired solution for a resilient domestic rare earth element supply chain. The team is multi-institutional comprising a national laboratory, universities and companies with diverse expertise in separation and recycling sciences, functional materials development, and technoeconomic and lifecycle analyses. The solution provided is multiscale including fundamental sciences, early stage applied research, and testing in relevant commercial devices for industrial deployment.