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A 3D Metal Printer to Enable Innovations in Nuclear Materials and Sensors

PI: Michael F. Hurley, Boise State University

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Collaborators:

David Estrada, Boise State University

Brian Jaques, Boise State University

Donna Guillen, Idaho National Laboratory

ABSTRACT

Objectives:

In collaboration with the Center for Advanced Energy Studies (CAES), our goal is to procure a 3D metal printer to advance innovations in materials and sensors for nuclear energy applications. The 3D metal printer, which enables the fabrication of complex and integrated structures not achievable using conventional manufacturing techniques, will be housed at the shared CAES facility in Idaho Falls. In doing so, we will be positioned to

1. Demonstrate 3D printing of metal parts and associated build parameter datasets for rapid prototyping of additively manufactured components.
2. Demonstrate conformal printing of nuclear grade inks on printed metal parts for embedded sensor applications.
3. Evaluate processing-microstructure-properties of 3D printed nuclear energy-relevant metals.

Description:

This project will establish the capability to additively manufacture metallic nuclear grade materials at the Center for Advanced Energy Studies (CAES) and within the Nuclear Sciences User Facilities (NSUF) network. This capability will **(a)** enhance the ability to conduct research relevant to the Office of Nuclear Energy's mission through collaborations between Boise State, the CAES consortium, and the NSUF network, **(b)** advance fundamental understanding of the impact irradiation has on the structure-property-processing-performance of additively manufactured nuclear materials and embedded sensors, **(c)** enable rapid prototyping and deployment of additively manufactured components for in-core experiments and next generation nuclear reactor technologies, and **(d)** expand research capabilities and educational programs in additive manufacturing and nuclear technologies to attract and train high quality students for the nuclear energy workforce.