

**SECTION A. Project Title: Benchmarking Microscale Ductility Measurements – University of Utah****SECTION B. Project Description**

The University of Utah, in collaboration with Utah State University, proposes to establish best practices for obtaining tensile microscale ductility measurements, and validate methodologies for comparing microscale ductility measurements to macroscale ductility measurements. The primary tasks to be completed in the proposed work are: (1) Microscale experimental measurements) MEMs based micro-tension loading device fabrication; (2) Surface (2D) and volumetric (3D) characterization of parent materials from which all specimens will be extracted; (3) Mechanical testing of specimens with thicknesses on the micro- (1-10\_μm), meso-(10-100's\_μm), and macroscales (sub-sized ASTM E8 [8]); (4) High-throughput simulation of microscale tensile specimen mechanical behavior with real (digital twin) and representative microstructures; and (5) Postmortem transmission electron microscopy (TEM) observations of size-effect influences on dislocation mechanism activity.

**SECTION C. Environmental Aspects / Potential Sources of Impact**

Chemical Use/Storage and Chemical Waste Disposal – Chemicals (e.g., nitric acid) will be used to etch specimens during preparation. For the duration of the project, all chemicals will be stored in appropriately rated storage cabinets and containers. Quantities required by the project are less than 5 liters. After use, all chemicals will be disposed of through the University of Utah Occupational and Environmental Health and Safety Office (HSO).

**SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.**

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not “connected” nor “related” (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial development.

Justification: The activity consists of university-scale research activities aimed at establishing an experimental approach and simulation framework that can be used to upscale microscale ductility measurements to predict macroscale ductility.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act)  Yes  No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on 08/14/2018